

Educational Services To The Children With Low Vision (V.I) To Be Executed By The Special Educators

Paper ID	IJIFR/V3/ E11/ 031	Page No.	4123-4131	Subject Area	Education
Key Words	Educational Services, Special Educators, Children (VI) With Low Vision				

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Abstract

As Education to the visually challenged was fully based on 'Braille Technology' in the earlier era, many V.I students with some remaining vision or with residual visual efficiency hesitated to receive Braille in order to avoid to be stamped as 'Blind'. They tried their level best to read the books using their remaining vision taking much risk. Even the regular class room teachers also felt in cross roads in getting the responses/answers from the children with low vision, 'Low vision Care' in the educational setup is a still a typical care in all the three types of educational programs for the past several years, even the children with residual vision/ moderate visual efficiency have been educated with Braille methodology only. But from the experience of the special Educators it has been understood that much more things in the area of 'Educational services to the children with Low vision' are still kept wide open. The Special educators working in all three types of programs are still in cross roads, in educating the children with 'Low vision'. At this juncture, the investigator put forth his efforts to study the educational services to be executed by the special educators to satisfy the needs of the children (VI) with Low vision.

1. INTRODUCTION

‘Education’ is the manifestation of perfection already in man` are the golden words of Swami Vivekananda. The main purpose of education is to bring out the inner potentialities of human souls. Education is unavoidable, inevitable and of much use in our day today existing life career. In our current society without education human life is meaningless. So Education is confidently a lifelong process of acquiring new ideas, skills, experiences through both formal and informal exposure to information, ideas and experiences. Education is a growing academic discipline. The theme of ‘Education to the differently abled children’ also should be focused at the same idea. Today it is truly accepted that ‘Every birth cries for education’. Education plays a vital role in every aspect of our society at present. The Society of the visually challenged, Hearing Impaired, Mentally retarded, physically challenged etc. are not exempted to this regard.

As far as Education for the visually challenged is concerned, it received the main focus only after our independence from the British. In 1960’s some special schools for the visually challenged children in the name “School for the Blind” were begun here and there in India. Apart from the government schools, some private voluntary agencies also showed more interest in feeding education to the visually impaired children by inaugurating “Special school for the Blind”. It has been a set up till today for the children with visual loss where the blind children only are studying and living together having ‘A dark Society’. In order to rectify the demerits of this setup and in order to make the Differently abled children to survive with the normal society, ‘Integrated Education for visually Handicapped’ was established in 1980’s at Sri Ramakrishna Vidyalaya, Coimbatore. Later it has been flourished throughout the country in the name of Integrated Education/Inclusive Education by the non-governmental agencies as well as government services such as SSA, RMSA etc;

2. STATEMENT OF THE STUDY

To study and exhibit the necessary educational services to be executed by the special educators towards the education of the children with ‘low vision` the investigator has taken up this research on ‘**Educational services to be rendered by the special educators to the children with ‘low vision`**’, which is the entitled title of the study here. This study focuses on the educational services to the children with ‘Low vision to be executed by the special educators working in the special schools for the blind and integrated normal schools.

3.OBJECTIVES OF THE STUDY

- I. To find out the special educators` views over the educational services to be executed by them to the children with ‘Low vision`.
- II. To find out the educational services to be rendered to the children with ‘low vision.

4. METHODOLOGY

- I. The investigator has studied the attitude and opinions of the special educators regarding the educational services to the children with Low vision.
- II. He has also made an analysis of comparisons of the response scores received from the special educators.

4.1 Sample

The special educators 40 from SSA (IED) schools and 40 from the schools for the blind in the schools nearby Madurai who are dealing with the children with some residual vision are considered as the sample for this study

4.2 Tools used for the study

The 5 point attitude scale developed by Likert is used as a tool for this study. This questionnaire contains 40 favourable and 40 unfavourable questions. Each statement contains five aspects namely Strongly Agree, Agree, No opinion, Disagree, Strongly Disagree.

4.3 Data gathering Process

The Investigator met all the special educators in person supplying the questionnaire individually to the special educators he collected the necessary data from all the 80 special educators from both setups.

5. Analysis and Interpretation

The Investigator for this study designed the questionnaire covering 11 major services to be rendered to the children with Low Vision (V.I). The received responses from the special educators based on their ideas, attitude towards the services to the children with Low vision are considered for the analysis. For favourable items the scores are given as 5-S.A, 4-A, 3-N.O, 2-S.D.A, 1-D.A, for the unfavourable items in the reverse order.

Table1- General Scores of IED/Special Schools Special Educators

Class Interval	F	D	D ²	FD	FD ²	C.F
290-299	1	-5	25	-5	25	1
300-309	1	-4	16	-4	16	2
310-319	4	-3	9	-12	36	6
320-329	9	2	4	-18	36	15
330-339	9	-1	1	-9	9	24
340-349	11	0	0	0	0	35
350-359	14	1	1	14	14	49
360-369	12	2	4	24	48	61
370-379	8	3	9	24	72	69
380-389	7	4	16	28	112	76
390-399	4	5	25	20	100	80
sum	N=80			62	468	

The Significance was found out by using 't' test in this study.

6. FINDINGS

From this table, the calculated mean value is 355.4 and the standard deviation is 26.34. The skewness is 0.23 and 'ku' value is 0.21. So it is Leptokurtic. This reflected that the special educators working in both various setups have shown the same, high degree of acceptance towards the educational services to be executed by the special educators to the children with low vision. The calculated 't' value 1.42 is less than the tabulated 't' value 1.99 at 0.05 significant level. This represents that there is no significant difference between the general scores of the special educators working in the special schools for the blind and those who are working in the SSA (IED) schools regarding the educational services to be rendered by the special educators to the children with residual vision. It is clear that both the sectors ie; special educators working in the school for the blind and IED (SSA) schools have shown their strong acceptance in executing the educational services to the children with Low vision which are completely away from the Braille methodology. The following are the essential educational services to the children with low vision to be executed by the special educators:

Services to the children with Low vision

(i) Vision Screening

- Distance visual Activity
- Near vision Activity
- Visual field
- Colour contrast
- Colour vision

These tests have to be conducted using Snelling chart, E card, near vision card with N 48, N 20, N 8 size letters. On the responses of the distance visual acuity and near vision acuity tests, the educational services either Braille or large print or print with magnifiers has to be decided. By testing the visual field the mobility techniques cane/sighted guide has to be provided. On the basis of colour, contrast tests the ink and the font size of letters to be used has to be decided.

(ii) Causes and educational implications

The teacher has to extend the proper educational service to the Low vision child after confirming the cause for the visual impairment on the basis of the certificate/consultation of the ophthalmologist.

(iii) Assessment of Functional Vision

Before the assessment of the visual functioning the special educators ought to concentrate the following;

1. Determination of current visual functioning level of each child.
2. Determination of the visual stimulation and instruction needed.
3. To help the child to use his/her limited vision to the highest potential.
4. To use visual stimulating materials most appropriate to the child.
5. Determination of nature of the primary reading medium.

Functional assessment is an on-going process. The special educators have to assess the various skills in visual functioning.

- a) Optical functioning
 - 1. Visual Awareness
 - 2. Visual Attention
 - 3. Visual Fixation
 - 4. Visual Focus
 - 5. Visual Fusion
 - 6. Visual Tracking
 - 7. Visual Scanning
- b) Perceptual functioning
 - 1. Visual Discrimination
 - 2. Visual Memory
 - 3. Visual Closure
 - 4. Figure Ground
 - 5. Mobility
 - 6. Visual Motor co-ordination
 - 7. Spatial Relations

The function assessment and training should go in hand. The Observations from this assessment should be shared with parents, colleague and regular class room teachers.

- (iv) Activities to develop various basic skills
 - a) Scanning and search Procedures
 - b) Shapes and Object Constancy
 - c) Object naming and recognition
 - d) Discrimination of details-3D objects (ex: pen, watch, ball)
 - e) Discrimination of details-2D shapes & representation (ex: Puzzles, books, Drawings can offer appropriate practice in this skill)
 - f) Perception of 2D objects
 - g) Perception of 2D-book illustration
 - h) Symmetry & Patterns
 - i) Communication by means of body and facial gestures
 - j) Hand-eye Co-ordination
 - k) Colour Discrimination
 - l) Direction & Movement Perception
- (v) Activities to develop Independent visual reading skills
 - (a) Word symbols with objects and action pictures
 - (b) Picture puzzles
 - * Labels to things in the class room
 - * Action words--;jump, run
 - * Album

- (c) Individual letter and work symbols
 - * Discrimination
 - * Recognition
 - * Identification
- (d) Visual Reading from simple materials
 - * Known songs, stories & verses
 - * Let the L.V children to draw picture
 - * Let the children to speak about their picnic
 - * To build a sentence from group of words
 - * Use text books
 - * Make them to listen short stories
 - * Diminishing gradually the print size of letters.
- (vi) Activities to increase reading speed
 - * Check fast reading
 - I
 - I played
 - I played cricket
 - I played cricket yesterday
 - * Systematic scanning techniques
 - * Teach them to use the principle of 'Continuity'.
 - * Allow them to use line markers/slitted papers
 - * Let them use L.V aids and equipments.
- (vii) Activities to develop Independent writing skills
 - * Hand-eye Co-ordination
 - * Pre-writing activities
 - * Hand manipulating activities
 - * Specific writing activities
- (viii) Activities to develop related skills
 - * Sight & smell
 - * Sight & Touch
 - * Sight & Sound
 - * Sight & Taste
 - * Art experience
 - * Craft experience
 - * Movements
 - * Music
 - * Science practical experiences
- (ix) Teaching & Training Activities
 - (a) Curricular activities
 - For print readers
 - * Reading print books/large print materials

- * Enlargement of print with magnifiers
- * Colourful picture books
- * Large Print diagrams
- * Large Print Essays, book matter etc;
- * Underlining with fluorescent pens
- * Audio-cassettes, CDs etc;
- * Flash cards
- * 2D album
- (b) Co-curricular activities
 - * Physical education
 - * Craft
 - * Art
 - * Music
 - * Movement (Drama, Dance, etc;)
 - * Science (Laboratory work)
- (c) Plus-Curricular Activities
 - * Sensory skills
 - * Training to use special devices
 - * Orientation & Mobility
 - * Daily living skills
- (x) Low vision Devices & Facilities
 - (a) Optical Devices
 - * Strong Magnifier
 - * Glasses with special prescriptions
 - * Tinted lenses
 - * Pocket scope
 - * Electronic Magnification
 - * Magnifying sheets
 - (b) Non-Optical Devices
 - * White board
 - * Writing paper
 - * Signature Card
 - * Usage of Dark colour scale
 - * Typo scope
 - * Black ink pen
 - * Audio-Recorder, Cassettes, CDs
 - * Adjustable Reading stand
 - * Fluorescent High lighter
 - * Table lamp
 - * Large print books/materials
 - * Black slate/chalk board

- * Good lighting
 - * Using finger while reading
- (xi) Other Aspects on 'Low vision services'
- * Parents Counselling
 - * Routine eye examination and counselling
 - * Record keeping
 - * Visual Aids-Usage
 - * Legibility of print
 - * Classroom Adjustments

7. RECOMMENDATION

- a. The services to the children with low vision mainly focus on the maximum usage of the residual vision. It is strongly believed that the visual efficiency of the eyes can be improved through practice. To execute the educational services to the children with low vision the teachers have to undergo proper training before the intervention in executing this service.
- b. The children with low vision should be encouraged to utilise the remaining vision to the maximum potential. Their parents have to be educated well in this manner.
- c. Every school should be provided with a Low vision laboratory and a specialist to expedite the educational services to the children with low vision.
- d. The children with low vision should be psychologically motivated to utilize the facilities prescribed for the children with low vision.
- e. Periodical check up with the ophthalmologists should be kept in a record and the training has to be moderated by the special educators then and there.
- f. Provision of teaching aids, ophthalmic devices have to be determined by the educators on the basis of the medical reports from the ophthalmologists and the test reports conducted by the special educators.
- g. Parents & regular classroom teachers' periodical meetings for counselling have to be conducted and analysed about the children's on-going career.
- h. Low vision laboratory should be equipped with varieties of optical aids, non-optical devices and devices.

8. CONCLUSION

Generally speaking though this category of children with Low vision comes under Visual impairment, the educational services to both categories are /have to be different. This kind of separate services with the use of optical devices or large print or printed book with the use of magnifiers/optical devices getting away from the Braille methodology make this category(L.V)of children psychologically get motivated to study as well as socialisation along with their normal counterparts. So this educational service to the children with low vision by the special educators is inevitable, valuable and highly needful.

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Honest System And Corrupt Bureaucrats: Some Empirical Evidences From India

Paper ID	IJIFR/V3/ E11/ 032	Page No.	4132-4139	Subject Area	Business Economics
Key Words	Corruption, Bribery, Honesty, Experienced Bureaucrats, Senior Officers				
JEL Classification	K13, D23, H41				
Acknowledgement	This work is funded by ICSSR, New Delhi				

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Abstract

This paper is intended to know the public opinion about the bureaucrats and understand their perception about the honesty of bureaucrats. In this study researcher have collected the data about the honesty of the bureaucrats, identified the most corrupted bureaucrats in the study region along with the some important causes behind the corruption and bribery. The result shows that the bureaucrats are leaving their honesty for the bribery, Sr. and Jr. Officers both are not equally corrupted. It means the Sr. Officers are most corrupted in the study region and there is significant relationship between experience of the bureaucrats and his involvement in corruption.

1. INTRODUCTION

Honesty, moral values and ethics are most necessary things in the public services. We can't expect the better performance of the bureaucracy without honesty, moral values and ethics. The Indian system such is one of the best bureaucratic systems than other countries but not bureaucrats (Bagchi, 2007). This fact is highlighted by the many researchers and investigation reports in India. Even the Transparency International According to the Research from the University of East Anglia has found that people's honesty varies significantly between countries. This study indicates that the four least honest countries

were China, Japan, South Korea and India. However, remaining Asian countries were not significantly more dishonest than others in the quiz, where Japan had the lowest level of dishonesty¹. It is observed that dishonesty and devaluation of moral values always leads to bribery and corrupt practices along with misuse of powers (Barr et al 2009; Cameron et al, 2009; Gregg et al 2011; Nina Bobkova and Henrik Egbert, 2012). Hence, the present research was intended to know the facts about the bureaucrats in civil services departments.

2. OBJECTIVES AND SUPPOSITIONS

The present study was intended to know about the honesty and facts about bureaucratic corruption. Secondary objective of this study was to identify the most corrupted bureaucrat and causes of bureaucratic corruption. For the conducting this particular study researcher has assumed that the bureaucrats are misusing their powers, doing corruption and involving bribery. The researcher has assumed that the most experienced bureaucrats and junior level officers and clerical staff are mostly involved in the corruption and bribery.

3. DATA AND METHODS

Researcher has conducted a widespread survey and brief discussions with the respondents from different professions and different locations of Maharashtra state of India. There are 2306 responses were collected from six district areas of the Maharashtra state on the basis of purposive sampling method. The all responses were collected from the respondents in the connection of bureaucratic system of the public health care, education, local government, public revenue and police department. All the data was collected through the schedule containing Likert scale based statements and yes and no type questions followed by brief discussions with the respondents. And, the respondents in our sample are more professional, farmers, businessman, self-employed, employees, students, housewives and retired persons. Collected data was analyzed using SPSS 20.0

4. SAMPLING AND SAMPLE SIZE

There are total 35 districts in Maharashtra State (India) out of 36 districts researcher have selected 06 districts (*Satara (1), Ratnagiri(2), Yawatma (3), Wardha (4), Latur (5) and Nashik (6)*) and its 70 *Tehsils* (Blocks) for in-depth investigation. Sample district has been selected based on reports of the Anti-Corruption Bureau, Maharashtra. There are six circle offices i.e. Amravati Range, Aurangabad Range, Mumbai Range, Nagpur Range, Nanded Range, Nashik Range, Pune Range and Thane Range, out of these six ranges of The Maharashtra State Anti-Corruption Bureau one district has been selected for the study. As per the census data published in Census 2011 researcher have selected 02 districts from lower population, 02 from middle population and 02 from higher population

¹ Study finds honesty varies significantly between countries, <https://www.uea.ac.uk/about/-/study-finds-honesty-varies-significantly-between-countries>

than state average population. Researcher has surveyed total 2306 respondents from these places. The respondents has selected using cluster cum convenient sampling techniques. Following technique has been used for calculating sample size for finite population as sown below:

For the getting overall responses the researcher has been collected responses from the different type of respondents. These occupations and professions covers almost of the respondents required to get different opinions of the common man in Indian society. Table 4 indicates that the 5.2% of are farmers, 23.4% are self-employed, 10.5% are businessmen, 19.7% are employees, 23.4 are students, 0.4% are housewives, 2.65 are unemployed and 14.9% are retired persons. District wise distribution of the respondents is varies by occupation and profession however; researcher has tried to cover all type of the respondents in this study.

5. DATA ANALYSIS AND INTERPRETATION

Honesty is one of the important required characteristics of the bureaucrats. However, it is observed that many of the democratic nations don't have the all honest bureaucrats with the government. Many bureaucrats side track their honesty for their private gain, bribe money, favoring to the nearest one etc. The dishonest bureaucrats that are able to take bribes and it will be discovered with probability theorem; while those that are honest are not involving in the corruption, so that the 'honest bureaucrats' do not become corrupted it means bureaucrats who are honest do not accept bribes (Giuseppe, 2006). According to the public opinion Table 1 shows that the 91.2% of the respondents said that the bureaucrats are leaving their honesty for taking bribe money and only 8.8% of the respondents said that the bureaucrats are honest and they are not leaving their honesty for bribe money.

Table 1: Public opinion about Bureaucrats			
	Leaving honesty for bribe money	Not Leaving honesty for bribe money	Total
District 1	356	28	384
District 2	307	77	384
District 3	378	6	384
District 4	348	36	384
District 5	378	8	386
District 6	337	47	384
Total Study Area	2104 (91.2%)	202 (8.8%)	2306 (100%)

Source: Filed Work

Hypo-1

H₀ – The all bureaucrats are honest and they are not taking bribe money, is the perception of the respondents

H1 – The all bureaucrats are dishonest and they are taking bribe money, is the perception of the respondents

To test this hypotheses the one sample Binomial test was used (Table 2); and result shows that (Test Statistics 202.000; p value.000) the bureaucrats are leaving their honesty for the bribery. Hence, the null hypotheses were rejected and alternative hypotheses were accepted (**Figure 1**).

Table 2: One-Sample Binomial Test				
Null Hypothesis	Test Statistics	Std Error	Sig.	Decision
The categories defined by Leaving honesty for bribe money = False and True occur with probabilities 0.5 and 0.5.	202.000	21.010	.000	Reject the null hypothesis.
Asymptotic significances are displayed. The significance level is .05. N - 2306				

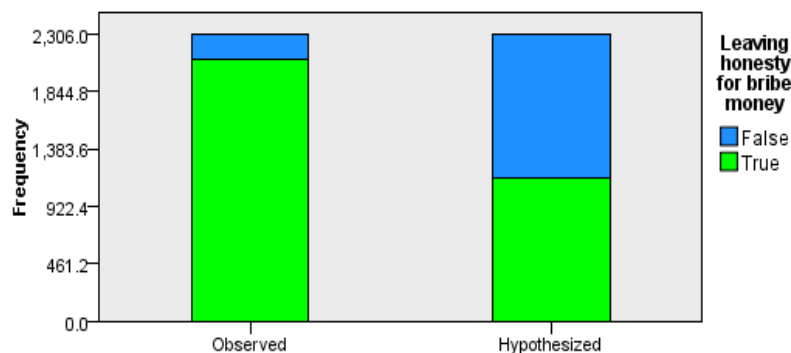


Figure 1: Honesty and Dishonesty of bureaucrats

Table 3 indicates that the perception of the respondents about corrupt and non-corrupted Jr. and Sr. Officers. The data indicates that the Sr. Officers are more corrupted than the Jr. Officers in the study region. The district wise data also indicates the same thing.

Table 3: Corrupt Sr. Officers and Jr. Officers: Public Opinion						
	Sr Officers			Jr Officers		
	Corrupted	Not Corrupted	Total	Corrupted	Not Corrupted	Total
District 1	63.3%	36.7%	100%	37.5%	62.5%	100%
District 2	64.1%	35.9%	100%	42.4%	57.6%	100%
District 3	71.9%	28.1%	100%	22.4%	77.6%	100%
District 4	58.3%	41.7%	100%	43.0%	57.0%	100%
District 5	56.7%	43.3%	100%	58.3%	41.7%	100%
District 6	57.6%	42.4%	100%	40.1%	59.9%	100%
Total	62.0%	38.0%	100%	40.6%	59.4%	100%

Source: Filed work

Hypo-2

H0 – Sr. and Jr. Officers both are equally corrupted

H1 – Sr. and Jr. Officers both are not equally corrupted

For the Testing of this hypothesis we have used Related-Samples McNemar Test. The McNemar test is used to determine if there are differences on a dichotomous dependent variable between two related groups. It can be considered to be similar to the paired-samples t-test, but for a dichotomous rather than a continuous dependent variable². We have assumed that the Sr. Officers and Jr. Officers are related groups because the Sr. Officers always influence the behavior of the Jr. Officers. Table 4 directs to (**Test Statistics** -174.444; df -1 with p value .000) the reject null hypothesis and accept alternative hypothesis. i.e. Sr. and Jr. Officers both are not equally corrupted. It means (Table 3) the Sr. Officers are most corrupted in the study region.

Table 4: Related-Samples McNemar Test				
Null Hypothesis	Test Statistics	df	Sig.	Decision
The distributions of different values across Sr Officers and Jr Officers are equal	174.444	1	.000	Reject the null hypothesis.
Asymptotic significances are displayed. The significance level is .05. N - 2306				

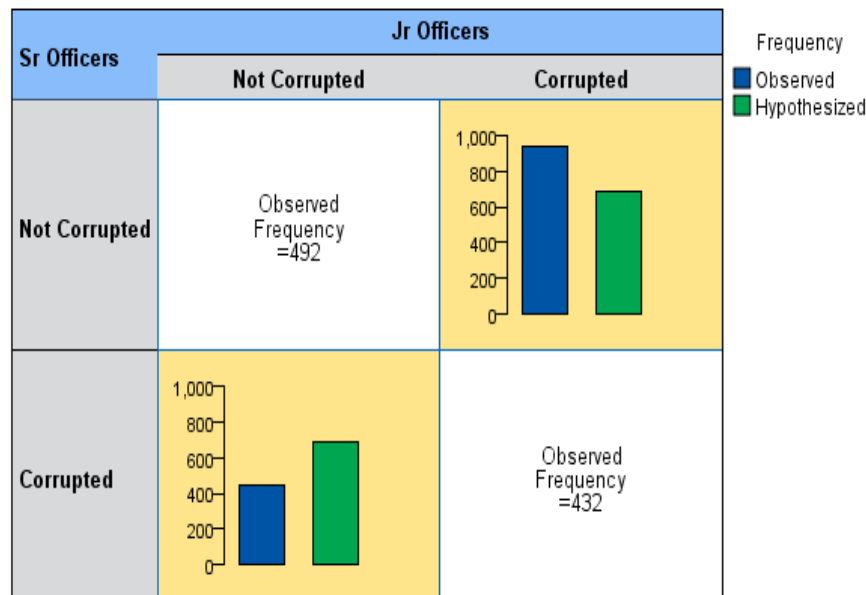


Figure 2: Sr. Officers and Jr. Officers

Table 5 indicates that the most experienced officers are most involved in the corruption and newly appointed officers are less involved in the corruption. According to the public opinion it can be concluded that only 9.3% of newly appointed officers are involved in

² <https://statistics.laerd.com/spss-tutorials/mcnemars-test-using-spss-statistics.php>

corruption, 21.9% of medium experienced officers are involved in corruption and 78.5% of most experienced officers are largely involved in corruption.

Table 5: Corrupt Officers: Experienced or Newly Appointed?						
	Newly Appointed		Medium Experienced		Most Experienced	
	Corrupted	Not Corrupted	Corrupted	Not Corrupted	Corrupted	Not Corrupted
District 1	8.9%	91.1%	21.9%	78.1%	77.3%	22.7%
District 2	7.6%	92.4%	29.4%	70.6%	80.5%	19.5%
District 3	9.6%	90.4%	14.6%	85.4%	79.9%	20.1%
District 4	11.5%	88.5%	32.3%	67.7%	68.0%	32.0%
District 5	1.0%	99.0%	9.1%	90.9%	94.0%	6.0%
District 6	17.2%	82.8%	24.5%	75.5%	71.4%	28.6%
Total	9.3%	90.7%	21.9%	78.1%	78.5%	21.5%

Source: Field Work

Hypo-2

H₀ – There is no significant relationship between experience and involvement in corrupt practices

H₁ – There is significant relationship between experience and involvement in corrupt practices

Table 6 indicates that there is significant relationship between experience of the bureaucrats and his involvement in corruption ($r = .587$ and p value $.000$). It leads to reject null hypothesis and accept the alternative hypothesis.

Table 6: Correlations between Experience & Involvement in Corruption			
		Experience	Involvement in Corruption
Experience	Pearson Correlation	1	.587**
	Sig. (2-tailed)		.000
	N	2306	2306
Involvement in Corruption	Pearson Correlation	.587**	1
	Sig. (2-tailed)	.000	
	N	2306	2306

** . Correlation is significant at the 0.01 level (2-tailed).

6. DISCUSSION AND CONCLUSION

Corruption in the bureaucracy is steeply rising. Just have a look at the extending trail of corruption. The CBI has registered FIRs against the corrupt officers of all India services – IAS, IPS, IRS and other related services since 2007. The CBI has charge sheeted 108 officers including 31 IAS/IPS and 25 of related services. The agency however failed to secure a good conviction record (C. Adhikesavan, 2010). Overall results and data indicate that the many bureaucrats leaving their honesty for the illegal money or bribe and doing corruption in India. According to Ritwik Banerjee and Tushi Baul (2012). An honest person may join the government and recalibrate his ex-ante prior of monitoring and

inspection downwards (Treisman (2000)). It may as well be that rampant corruption among peers may lower his moral cost. There is need of scheme of honesty bonus which will be leads to enhance honesty among the bureaucrats. There should be reward system for the honest bureaucrats who keep their honesty in civil services. There are some provisions for honesty rewards but it is not enough to enhance honesty among the bureaucrats. This scheme should be extended to the all sectors and department of the government or all types of civil services.

It is observed that the most Sr. officers are mostly involved in the corrupt practices it is a dangerous sign for the civil services because these officers are highly paid officers than others in the present bureaucratic system. However, it is happening in the bureaucratic system due to the diminishing marginal utility of the money. Because after increasing income level the utility of the money has declined much more hence these officers tries to acquire more money for get more utility from the money. We therefore should have to make them sensitize about the income inequalities and problem of the common man; how they are living due to the insufficient income sources. We should make aware them the importance of moral value and ethics as well as importance of honesty in the life. No doubt they might be known about this but we should have to sensitise bureaucrats about this and it will definitely affect positively.

The overall perception of the respondents indicates that the more experienced officers are involving more in the corrupt practices. It happening in India due to the wrong confidence about corrupt practices, they understood that after getting promotion and more experience in the specific department or office he knows all loopholes of the system. After spending more years in the specific bureaucratic system he gets more power in his/her hand which gives him/her more tactics of corruption and bribery. And experienced bureaucrats believe that no one can ask me about his illegal activities, misuse of power, misuse of public funds etc. inactive judicial system, inefficient anti-corruption bureau, ignorance of the common man and support from the some political leaders. However, it is also found that some of the newly recruited officer confides that though he does not demand any bribe, (Deepak Parvatiyar,2014) but he has to accept a fixed cut through the channel comprising his juniors.

After discussion with the some bureaucrats and experts it is understood that there is one another factor that of peer pressure. Their own batch mates and seniors all around them try to convince them that being corrupt and operating within the system is the best thing to do. The peers create this pressure so as to feel good about them when their friends too become corrupt. The honest officers continue to stay honest and continue to fight the system; sooner or later they will realize that they can't beat the system. They will watch their batch mates moving ahead in life while they are working in some remote region (Aditya Thakur, 2016). All this will eventually have them accept defeat and they'll become a part of the system

Considering the all above situations and practices in civil services we should have to make provision of training about honesty, ethics and moral values. The government

should make this training compulsory to all bureaucrats and this type of training should be given frequently. There should be strict excitation of laws and legal provision made for the restrict corruption and bribery as well as misuse of power for private gain.

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Pseudo Topogenic And Totally Null Topogenic Graphs

Paper ID	IJIFR/V3/ E11/ 034	Page No.	4140-4149	Subject Area	Mathematics
Key Words	Topogenic Graphs, Edge Topogenic Graphs, Pseudo Topogenic Graph, Totally Null Topogenic Graph				

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Abstract

A new concept namely Pseudo Topogenic Graphs is introduced. Common families of graphs such as Path, Star and Complete Graphs are studied. Interrelations with the existing concepts namely Topogenic graphs has been analysed. Labeling the vertices and edges with subsets of a set X so that the label of the edges incident at a vertex are disjoint give rise to another new concept known as Totally Null Topogenic Graph and is discussed.

1. INTRODUCTION

The concept of Topogenic Graphs was introduced by B.D.Acharya et.al [1]. In topogenic graphs they have labeled the vertices with subsets of a ground set and edges by the symmetric difference of the label of vertices so that the labels form a topology. They have proved that the complete graph K_4 is not topogenic. Labeling the vertices of K_4 without the label ϕ , $f(V) \cup f^{\oplus}(E) \cup \phi$ form a topology with ground set having 3 elements. This resulted in the first variation of Topogenic graphs namely Pseudo Topogenic graphs. Edge topogenic graphs dealt with the labeling of edges with subsets of X and vertices by the union of all the label of edges incident at

that vertex was introduced by R. B. Gnana Jothi and A. Uma Devi [2]. This motivated us to define a new term totally null topogenic graphs which is the labeling of $|V \cup E|$ in the set -indexer.

2. PSEUDO TOPOGENIC GRAPHS

2.1 Definition

A graph $G=(V,E)$ is said to be Pseudo Topogenic if it admits a set-indexer $f : V \rightarrow 2^X \setminus \{\emptyset\}$ such that $f(V) \cup f^\oplus(E) \cup \emptyset$ is a topology on X where $f^\oplus(uv) = f(u) \oplus f(v) \forall uv \in E(G)$.

Example: Path P_3 is pseudo topogenic. Take $X = \{1, 2, 3\}$

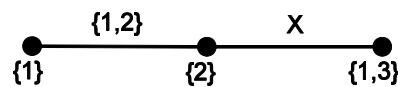


Figure 2.1: Pseudo topogenic set-indexer of P_3

$$f(V) \cup f^\oplus(E) \cup \emptyset = \{\emptyset, \{1\}, \{2\}, \{1, 2\}, \{1, 3\}, X\}$$

2.2 Definition

Pseudo topogenic index of a graph G is the minimum cardinality of ground set X such that G has a pseudo topogenic set-indexer with respect to X .

2.3 Notation

Let $Pt_i(G)$ denote the pseudo topogenic index of G .

2.4 Observation

In a graph topogenic index may be strictly greater than pseudo topogenic index.

Example: Consider the path P_4 .

For a topogenic set-indexer of P_4 , we need at least 3 elements in X . As there is no topology with 7 subsets of $X=\{1,2,3\}$, we take 4 elements in X . Topogenic set-indexer of P_4 is

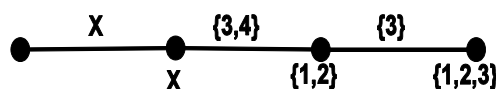


Figure 2.2: Topogenic set-indexer of P_4

$$\tau = \{\emptyset, X, \{3\}, \{1, 2\}, \{3, 4\}, \{1, 2, 3\}\}$$

$$\Upsilon(P_4) = 4.$$

For a pseudo topogenic set-indexer of P_4 , 3 elements are needed in X , since \emptyset cannot be labeled to any vertex. Take $X=\{1,2,3\}$. Pseudo topogenic set-indexer of P_4 is

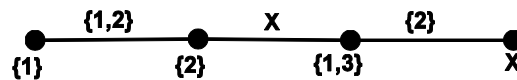


Figure 2.3: Pseudo topogenic set-indexer of P₄

$$f(V) \cup f^{\oplus}(E) \cup \varphi = \{\varphi, \{1\}, \{2\}, \{1, 2\}, \{1, 3\}, X\}$$

$$Pti(P_4) = 3.$$

$$\Upsilon(P_4) > Pti(P_4)$$

2.5 Observation

In a graph topogenic index may be equal to pseudo to- pogenic index.

Example: Consider the path P₃

As there are 3 vertices, at least 2 elements are needed in X. Topogenic set-indexer of P₃ with X={1,2}

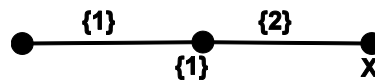


Figure 2.4: Topogenic set-indexer of P₃

$$\tau = \{\varphi, \{1\}, \{2\}, X\}, \Upsilon(P_3) = 2.$$

Pseudo topogenic set-indexer of P₃ with X={1,2}

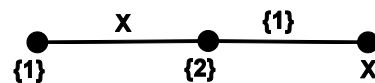


Figure 2.5: Pseudo topogenic set-indexer of P₃

$$f(V) \cup f^{\oplus}(E) \cup \varphi = \{\varphi, \{1\}, \{2\}, X\}, Pti(P_3) = 2.$$

$$\Upsilon(P_3) = Pti(P_3)$$

2.6 Observation

In a graph topogenic index may be strictly less than pseudo topogenic index.

Example: Consider the star graph K_{1,3}.

Let X={1,2}. It has 4 subsets. Assign φ to the central vertex, remaining 3 subsets are assigned to the other vertices. Topogenic set-indexer of K_{1,3} is

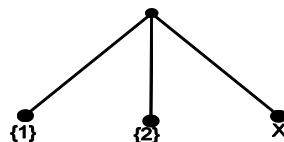


Figure 2.6: Topogenic set-indexer of K_{1,3}

$$\tau = \{\varphi, \{1\}, \{2\}, X\}, \Upsilon(K_{1,3}) = 2.$$

For a Pseudo topogenic set-indexer, as φ is not included for labeling the four vertices, at least 4 non-empty sub- sets of X are needed which is possible with X={1,2,3}. Assign {1} to the central vertex. Label the remaining vertices as $f(v_i) = \{2, 3, \dots, i\}; 2 \leq i \leq n-1$ and $f(v_n) = X$. Pseudo topogenic set-indexer of K_{1,3} is

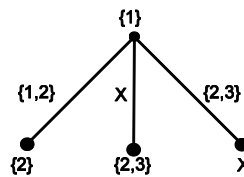


Figure 2.7: Pseudo topogenic set-indexer of $K_{1,3}$

$f(V) \cup f^{\oplus}(E) \cup \varphi = \{\varphi, \{1\}, \{2\}, \{1, 2\}, \{2, 3\}, X\}$, $Pti(K_{1,3}) = 3$.

Hence $\Upsilon(K_{1,3}) < Pti(K_{1,3})$

2.7 Theorem

Star graph $(K_{1,n})$ is pseudo topogenic for every positive integer n .

Proof:

Let $V(K_{1,n}) = \{u_0, v_1, v_2, \dots, v_n\}$ and

$E(K_{1,n}) = \{u_0v_i / i = 1, 2, \dots, n\}$

Take the ground set $X = \{1, 2, \dots, (n+1)\}$.

Label the vertices as $f(u_0) = \{1\}, f(v_i) = \{1, 2, \dots, (i+1)\}; 1 \leq i \leq n$

Then $f^{\oplus}(u_0v_i) = \{2, 3, \dots, (i+1)\}; 2 \leq i \leq n$ and $f(u_0) \subset f(v_1) \subset \dots \subset f(v_{n-1}) \subset f(v_n)$

$f(u_0) \cup f(v_i) = f(v_i); 1 \leq i \leq n$ $f(u_0) \cap f(v_i) = \varphi$

Then $f(V) \cup f^{\oplus}(E) \cup \varphi$ forms a topology on X . Hence Star graph is pseudo topogenic.

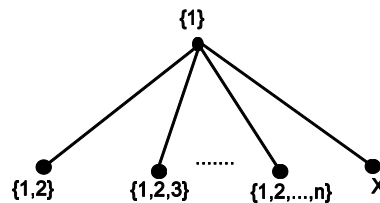


Figure 2.8: Pseudo topogenic set-indexer of $K_{1,n}$

2.8 Note

Pseudo topogenic labeling need not be unique.

For example , Another pseudo topogenic labeling of $K_{1,n}$ with $X = \{1, 2, \dots, n\}$

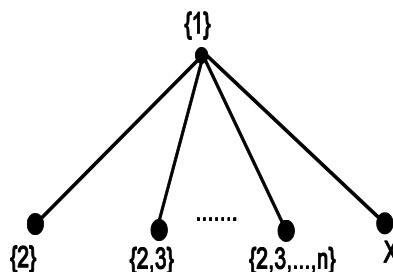


Figure 2.9 Pseudo topogenic set-indexer of $K_{1,n}$

2.9 Theorem

The complete graph (K_n) is pseudo topogenic for $n = 3, 4, 5$.

Proof:

When $n=3$, Take $X=\{1,2\}$

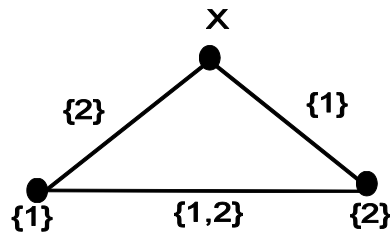
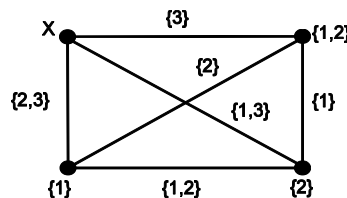


Figure 2.10: Pseudo topogenic set-indexer of K_3

$$f(V) \cup f^{\oplus}(E) \cup \varnothing = \{\varnothing, \{1\}, \{2\}, X\}.$$

When $n=4$, Take $X=\{1,2,3\}$



$$f(V) \cup f^{\oplus}(E) \cup \varnothing = \{\varnothing, \{1\}, \{2\}, \{3\}, \{1,2\}, \{1,3\}, \{2,3\}, X\}.$$

When $n=5$, Take $X=\{1,2,3,4\}$

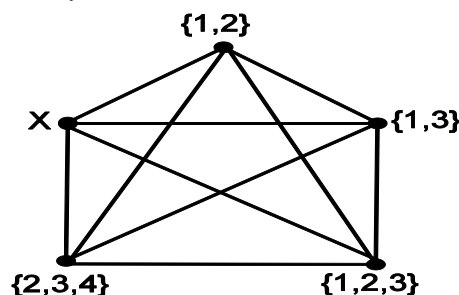


Figure 2.11: Pseudo topogenic set-indexer of K_5

$$f(V) \cup f^{\oplus}(E) \cup \varnothing = \{\varnothing, \{1\}, \{2\}, \{3\}, \{4\}, \{1,2\}, \{1,3\}, \{1,4\}, \{2,3\}, \{2,4\}, \{3,4\}, \{1,2,3\}, \{1,2,4\}, \{1,3,4\}, \{2,3,4\}, X\}.$$

Hence complete graph (K_n) is pseudo topogenic for $n = 3, 4, 5$.

2.10 Note

Complete graphs K_4 and K_5 are not topogenic [3], but they are Pseudo topogenic.

2.11 Theorem.

$$P t_i(K_n) = n - 1, \quad n = 3, 4, 5$$

Proof:

Theorem 2.9 provides Pseudo topogenic indexer for K_n with ground set

$$X = \{1, 2, \dots, (n - 1)\}$$

$$|E(K_n)| = n C_2 > 2^{n-2} \text{ for } n=3,4,5$$

$$\therefore P t_i(K_n) = n - 1, n = 3, 4, 5$$

3. TOTALLY NULL TOPOGENIC GRAPHS

3.1 Definition

A graph $G=(V,E)$ is said to be totally null topogenic if it admits a set-indexer $f : V \cup E \rightarrow 2^X$ such that

- (i) Range of f is a topology on X .
- (ii) $\bigcap_{v \in N(u)} f(uv) = \emptyset \forall u \in V(G)$ with $d(u) \geq 2$

$$(iii) 2^{|X|}-1 < |V \cup E| \leq 2^{|X|}$$

Example: Cycle C_3 is totally null topogenic.

When $n=3$, Take $X=\{1,2,3\}$; $2^{|X|} = 8, 4 < |V \cup E| = 6 < 2^{|X|}$

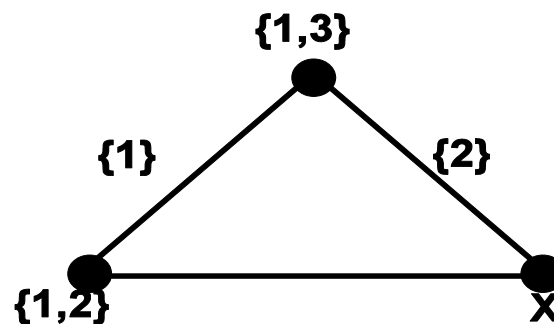


Figure 3.1: Totally null topogenic set- indexer of C_3

$$\tau = \{\emptyset, \{1\}, \{2\}, \{1,2\}, \{1,3\}, X\}$$

3.1 Observation

In a connected graph X cannot be assigned to any edge in any totally null topogenic labeling.

3.3 Theorem

Any graph G with $3 \cdot 2^{r-2} < |V \cup E| < 2^r$, is not totally null topogenic for some r .

Proof:

Let G be a graph with $3 \cdot 2^{r-2} < |V \cup E| < 2^r$, for some r .

If G is totally null topogenic, the ground set X should be chosen such that $2^{|X|}-1 < |V \cup E| < 2^{|X|}$ and $f(V \cup E)$ is a topology on $|V \cup E|$ elements.

$$\text{Now, } 2^{r-1} = 2 \cdot 2^{r-2} < 3 \cdot 2^{r-2} < 4 \cdot 2^{r-2} = 2^r.$$

By theorem "For $n \geq 3, T(n, k) = 0$ for every k with $3 \cdot 2^{n-2} < k < 2^n$ where $T(n, k) = |t(n, k)|$ is the set of all labeled topologies on X and having k open sets, $2 \leq k \leq 2^n$ " [1], there is no topology with k elements for $3 \cdot 2^{r-1} < k < 2^r$.

Therefore, G is not totally null topogenic if $3 \cdot 2^{r-2} < |V \cup E| < 2^r$, for some r .

Corollary:

K_5 and K_7 are not totally null topogenic graphs.

Proof:

When $r=4$, $3 \cdot 2^{r-2} = 12$ and $2^r = 16$.

In K_5 as $|V \cup E| = 15$, it is not totally null topogenic graph. When $r=5$, $3 \cdot 2^{r-2} = 24$ and $2^r = 32$.

In K_7 as $|V \cup E| = 28$, it is not totally null topogenic.

3.4 Theorem

Path (P_n) is totally null topogenic for $n = 3, 5, 9$.

Proof:

When $n=3$, Take $X = \{1, 2, 3\}$; $2^{|X|} = 8$, $4 < |V \cup E| = 5 < 2^{|X|}$.



Figure 3.2: Totally null topogenic set-indexer of P_3

$\tau = \{\emptyset, \{1\}, \{2\}, \{1, 2\}, X\}$.

When $n=5$, Take $X = \{1, 2, 3, 4\}$; $2^{|X|} = 16$, $8 < |V \cup E| = 9 < 2^{|X|}$.

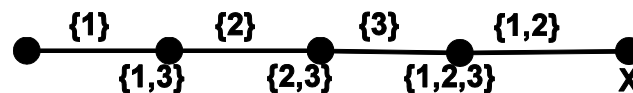


Figure 3.3: Totally null topogenic set-indexer of P_5

$\tau = \{\emptyset, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}, X\}$

When $n=9$, Take $X = \{1, 2, 3, 4, 5\}$, $2^{|X|} = 32$, $16 < |V \cup E| = 17 < 2^{|X|}$.

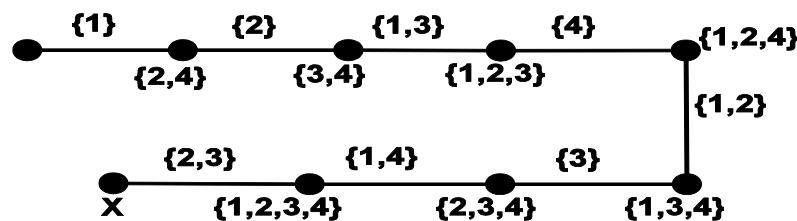


Figure 3.4: Totally null topogenic set-indexer of P_9

$\tau = \{\emptyset, \{1\}, \{2\}, \{3\}, \{4\}, \{1, 2\}, \{1, 3\}, \{1, 4\}, \{2, 3\}, \{2, 4\}, \{3, 4\}, \{1, 2, 3\}, \{1, 2, 4\}, \{1, 3, 4\}, \{2, 3, 4\}, \{1, 2, 3, 4\}, X\}$

3.5 Theorem

Cycles C_n are totally null topogenic for $3 \leq n \leq 6, 8 \leq n \leq 10$.

Proof:

When $n=3$, Take $X = \{1, 2, 3\}$; $2^{|X|} = 8$, $4 < |V \cup E| = 6 < 2^{|X|}$

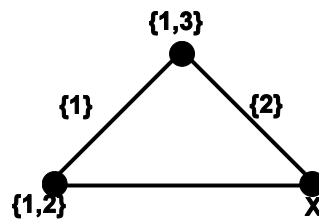


Figure 3.5: Totally null topogenic set- indexer of C_3

$$\tau = \{\emptyset, \{1\}, \{2\}, \{1, 2\}, \{1, 3\}, X\}$$

When $n=4$, Take $X=\{1,2,3\}$; $2^{|X|} = 8$, $4 < |V \cup E| = 8 = 2^{|X|}$

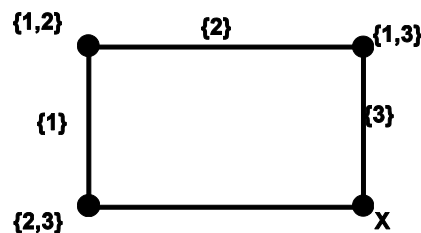


Figure 3.6: Totally null topogenic set- indexer of C_4

$$\tau = \{\emptyset, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, X\}.$$

We are able to accomplish till C_{10} . The results are tabulated below:

Table 3.1: Totally null topogenic set-indexer of C_n for $5 \leq n \leq 6, 8 \leq n \leq 10$.

Size of Cycle	Ground set	Indexer of f	$f(V \cup E)$
5	$X = \{1, 2, 3, 4\}$	$f(e_1) = \emptyset, f(e_2) = \{1\},$ $f(e_3) = \{2\}, f(e_4) = \{1, 3\},$ $f(e_5) = \{2, 3\}$	$\{\emptyset, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\},$ $\{2, 3\}, \{1, 2, 3\}, \{2, 3, 4\}, X\}$
6	$X = \{1, 2, 3, 4\}$	$f(e_1) = \emptyset, f(e_2) = \{1\},$ $f(e_3) = \{2, 3\}, f(e_4) = \{1, 4\},$ $f(e_5) = \{2\}, f(e_6) = \{4\}$	$\{\emptyset, \{1\}, \{2\}, \{4\}, \{1, 2\},$ $\{1, 4\}, \{2, 3\}, \{2, 4\}, \{1, 2, 3\}, \{1,$ $2, 4\}, \{2, 3, 4\}, X\}$
8	$X = \{1, 2, 3, 4\}$	$f(e_1) = \emptyset, f(e_2) = \{4\},$ $f(e_3) = \{1, 2\}, f(e_4) = \{3\},$ $f(e_5) = \{1, 4\}, f(e_6) = \{2\},$ $f(e_7) = \{3, 4\}, f(e_8) = \{1\}$	$\{\emptyset, \{1\}, \{2\}, \{3\}, \{4\}, \{1, 2\}, \{1,$ $3\}, \{1, 4\}, \{2, 3\}, \{2, 4\}, \{3, 4\},$ $\{1, 2, 3\}, \{1, 2, 4\}, \{1, 3, 4\}, \{2, 3,$ $4\}, X\}$
9	$X = \{1, 2, 3, 4, 5\}$	$f(e_1) = \emptyset, f(e_2) = \{1, 2, 4\},$ $f(e_3) = \{3\}, f(e_4) = \{4\},$ $f(e_5) = \{2, 3\}, f(e_6) = \{4, 5\},$ $f(e_7) = \{2\}, f(e_8) = \{3, 4, 5\},$ $f(e_9) = \{1, 2\}$	$\{\emptyset, \{2\}, \{3\}, \{4\}, \{1, 2\}, \{2, 3\},$ $\{2, 4\}, \{3, 4\}, \{4, 5\}, \{1, 2, 3\},$ $\{1, 2, 4\}, \{2, 3, 4\}, \{2, 4, 5\}, \{3, 4,$ $5\}, \{1, 2, 3, 4\}, \{1, 2, 4, 5\},$ $\{2, 3, 4, 5\}, X\}$
10	$X = \{1, 2, 3, 4, 5\}$	$f(e_1) = \emptyset, f(e_2) = \{4, 5\},$ $f(e_3) = \{2\}, f(e_4) = \{4\},$ $f(e_5) = \{1, 2, 3\}, f(e_6) = \{5\},$ $f(e_7) = \{2, 4\}, f(e_8) = \{3\},$ $f(e_9) = \{2, 5\}, f(e_{10}) = \{3, 4\}$	$\{\emptyset, \{2\}, \{3\}, \{4\}, \{5\}, \{2, 3\}, \{2,$ $4\}, \{2, 5\}, \{3, 4\}, \{3, 5\}, \{4, 5\}, \{1,$ $2, 3\},$ $\{2, 3, 4\}, \{2, 3, 5\}, \{2, 4, 5\}, \{3, 4,$ $5\},$ $\{1, 2, 3, 4\}, \{1, 2, 3, 5\}, \{2, 3, 4, 5\},$ $X\}$

3.6 Theorem

Star graph ($K_{1,n}$) is totally null topogenic for $n = 2, 4$.

Proof:

When $n=2$, Take $X=\{1,2,3\}$; $2^{|X|} = 8$, $4 < |V \cup E| = 5 < 2^{|X|}$.

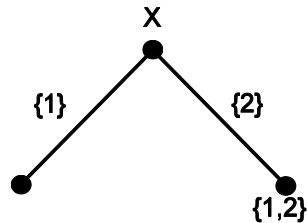


Figure 3.7: Totally null topogenic set-indexer of $K_{1,2}$

$\tau = \{\emptyset, \{1\}, \{2\}, \{1, 2\}, X\}$

When $n=4$, Take $X=\{1,2,3,4\}$; $2^{|X|} = 16$, $8 < |V \cup E| = 9 < 2^{|X|}$.

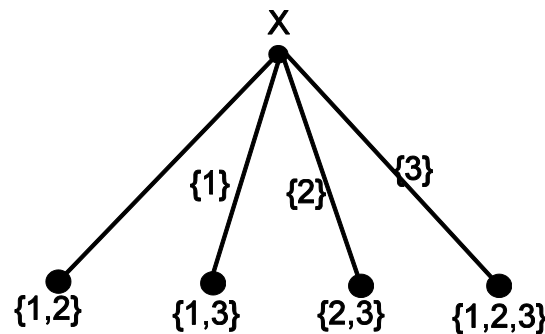


Figure 3.8: Totally null topogenic set-indexer of $K_{1,4}$

$\tau = \{\emptyset, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}, X\}$.

4. CONCLUSION

Introduction of two variations on topogenic set- indexers give rise to so many problems. It is quite interesting to see that a slight variation brings some important graphs such as complete graphs to the arena of consideration. Giving equal importance to vertices and edges is practised in totally null topogenic graphs. Here again only elementary families are dealt with. Problems which arose during the period of working are listed below.

- Determination of necessary/ sufficient/ necessary and sufficient condition for a graph to be topogenic/ pseudo topogenic/ totally null topogenic.
- Determining topogenic/ pseudo topogenic set index for families of graphs.
- Obtaining bounds for pseudo topogenic set index for some families of graphs.
- Determining totally null topogenic set index for complete graphs.
- With positive vibration that this is an useful piece for research, this article is concluded.

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6. BIOGRAPHIES



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Personal Reference in Manipuri

Paper ID	IJIFR/V3/ E11/ 036	Page No.	4150-4156	Subject Area	Linguistics
Key Words	Endophoric, Exophoric, Anaphoric, Ellipsis, Cohesion, Reference				

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Abstract

In Manipuri personal pronouns are used as personal reference items. In a cohesive discourse only the third person personal pronouns are used as reference item because they are anaphoric (referring to the text) whereas the remaining first and second persons are exophoric (referring to the situation). The third person personal pronoun mähak/ma 'he' refers to the person (male or female) and mākhoi 'they' refers to both person and lifeless thing. They are endophorically referring to the text i.e., they find their referent somewhere in the discourse. Those pronouns of first and second persons like ai 'I', aikhoi 'we', nəŋ 'you' (singular), nəkhoi 'you' (plural) exophorically refer to the situation i.e., they find their referent in the situation which is out of the discourse. Manipuri possessive pronouns like magi 'his/her' mākhoigi 'their' are also used as reference items. They are doubly anaphoric because they are both referential and elliptical. They are anaphoric by reference to the possessor and by ellipsis to the possessed. Personal references which are endophoric contribute a lot very markedly to the cohesion of a discourse as it helps to build a network of line of reference within a discourse.

1. INTRODUCTION

There are certain items in every language which have the property of reference, in the specific sense in which the term is used here; that is to say, instead of being interpreted semantically in their own right, they make reference to something else for their interpretation. In English these items are personal, demonstrative and comparatives. The items of reference are directive indicating that information is to be retrieved from elsewhere. So much they have in common with all cohesive elements. What characterises this particular type of cohesion, which is called reference, is the specific nature of the

information that is signalled for retrieval. In the case of the reference the information to be retrieved is the referential meaning, the identity of the particular thing or class of things that is being referred to; and the cohesion lies in the continuity of the reference, whereby the same thing enters into the discourse a second time. It is enough to say that reference has the semantic property of definiteness or specificity (Halliday & Hasan, 1976:31-32). Since the relationship is on the semantic level, the reference item is in no way constrained to match the grammatical class of the item it refers to. What must match are the semantic properties. As a general rule, reference items may be exophoric or endophoric; and if endophoric, they may be anaphoric or cataphoric. This scheme will allow us to recognize certain distinctions within the class of reference items, according to their different uses.

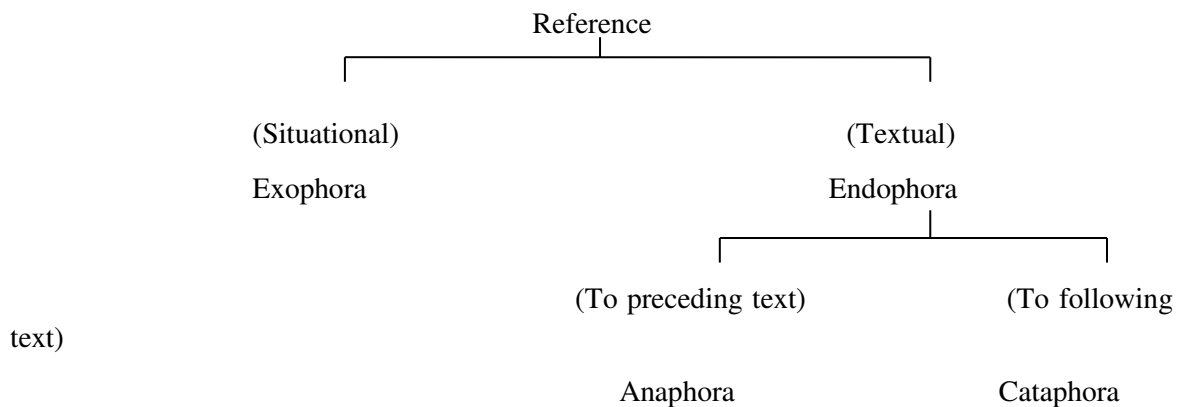


Figure 1.1: Scheme of Reference

1. Personal Reference

Personal reference is reference by means of function in the speech situation, through the category of person. Halliday and Hasan have given the person system in English as follows.

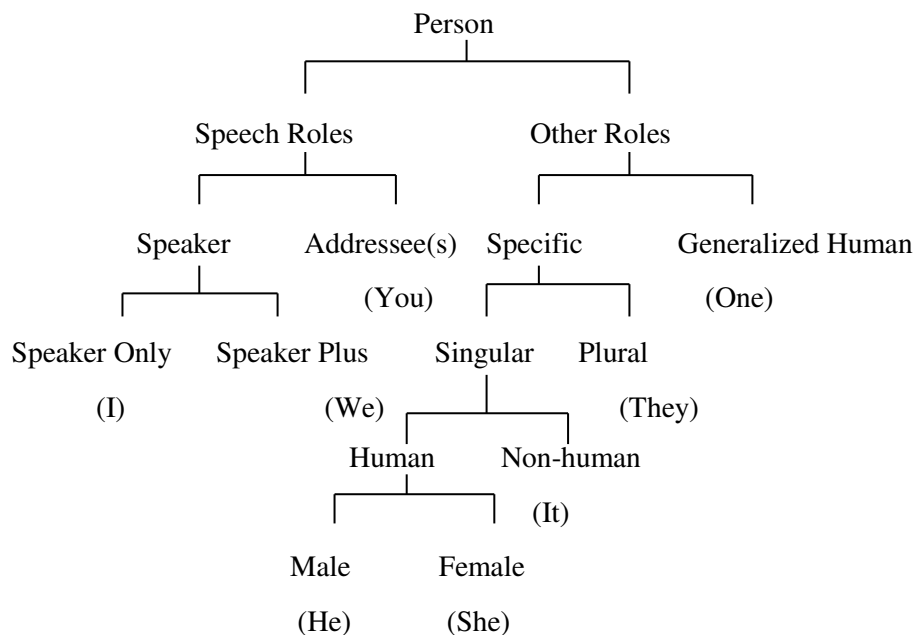


Figure 2.1: Person System in English

The personal pronouns, possessive determiners and possessive pronouns are all reference items; they refer to something by specifying its function or role in the speech situation. This system of reference is known as person, where 'person' is used in the special sense of 'role'. The traditionally recognized categories are first person, second person and third person intersecting with the number categories of singular and plural (Halliday & Hasan, 1976:44). The main categories used as personal reference in Manipuri are personal pronouns, possessive and possessive determiners. Here, those pronouns used for men only are discussed. The pronouns of Manipuri can be given as follows.

Table 2.2: Manipuri Pronouns

Person	Number	Personal pronoun	Possessive pronoun	Possessive determiner
First person	Singular	əi 'I'	əigi 'mine'	əigi 'my'
	Plural	ək ^h oi 'we'	ək ^h oigi 'ours'	ək ^h oigi 'our'
Second person	Singular	nəŋ 'you'	nəŋgi 'yours'	nəŋgi 'your'
	Plural	nək ^h oi 'you'	nək ^h oigi 'yours'	nək ^h oigi 'your'
Third person	Singular	məhak/ma 'he/she'	məhakki/magi 'his/hers'	məhakki/magi 'his/her'
	Plural	mək ^h oi 'they'	mək ^h oigi 'theirs'	mək ^h oigi 'their'

2. SPEECH ROLES AND OTHER ROLES

The system of reference in which the reference items refer to something by specifying its function or role in the speech situation is known as 'Person' (Halliday & Hasan, 1976:44). The traditionally recognized categories of person are first person, second person and third person. Manipuri also has three categories of personal pronoun. They have already been given in the table 2.2 of Manipuri pronouns.

The significance of the person system lies on the fact that it is the means of referring to the relevant persons and objects with relevance to the speech situation. Those personal pronouns that play a great role in the communication process are of speech roles and it consists of speaker and addressee. Other personal pronouns are those which are other than the speaker and addressee and it includes all the relevant entities excluding the speaker and addressee. One important thing to be noted here is that the speaker includes the first person pronouns əi 'I' and ək^hoi 'we' and the addressee i.e., the second person pronouns nəŋ 'you' (singular) and nək^hoi 'you' (plural). These two personal pronouns take a crucial part in the speech role of a speech situation.

The other roles mean the third person personal pronouns like məhak 'he/she', mək^hoi 'they'. Within the speech roles, the Manipuri person system recognizes only speaker əi 'I' and the addressee nəŋ 'you'. It does however comprise a third form əik^hoi 'we' that represents the speaker together with some other persons, among whom the addressee(s) may or may not be included.

Only the third person pronouns are inherently cohesive, in that a third person form typically refers anaphorically to an antecedent in the discourse. First and second persons do not normally refer to the discourse at all; their referents are defined by the speech roles of the speaker and hearer, and hence they are generally interpreted exophorically with reference to the situation. The first persons and second persons essentially refer to the situation whereas those of the third person refer anaphorically and cataphorically refer to the discourse (Halliday & Hasan, 1976;48). Some Manipuri instances are discussed here as follows:

I. əi-nə	nəŋ-bu	məp ^h əm	k ^h udiŋ	cəŋ-dunə	t ^h i-rəmi
I-NOM	you-ACC	place	every	enter-ADM	search-COMP
ədubu	nəŋ-di	ləi-rəm-də-re			
but	you-PART	live-COMP-NEG-PERF			

‘I was looking for you everywhere but you were not there.’

In the above given excerpt there has been one first person pronoun əi ‘I’ and second person nəŋ ‘you’. Nothing can be found in the text itself for their interpretation. For the interpretation of them it is required to look exophorically to the situation.

II. mi-jam-nə	tomba-bu	nuŋsi-φ	məhak	jam
human-many-NOM	Tomba-ACC	love-SAM	he	very
p ^h ə-bə	nupa-ni			
good-NMZ	man-COP			

‘People love Tomba. He is a very good man.’

In the case of example (ii), the third person pronoun məhak ‘he’ refers anaphorically to the noun ‘tomba’ (antecedent) which is in the preceding part of the text. It implies that the third person pronoun ‘məhak’ in the above given example is interpreted by means of anaphoric reference to the antecedent noun ‘tomba’ in the preceding part of the text.

One important point regarding the use of the first and second person pronouns is that the absence of the referent for the pronoun əi ‘I’ and nəŋ ‘you’ does not render a sense of incompleteness. Contrarily, a third person pronoun implies the presence of referent somewhere in the text and if the referent is absent in the text, it will be incomplete in meaning. So, the third person pronouns only contribute to a cohesive discourse as they can make a network of line of reference. They can only bring an internal cohesion within a discourse.

Some exceptions regarding the use of first and second person pronouns have come out. Generally, they are used exophorically referring to the situation but in quoted speech they can be anaphorically referring to an antecedent of the text.

III. tomba-nə	hai-φ	əi-nə	lanŋəmba-bu	p ^h u-gəni
Tomba-NOM	say-SAM	I-NOM	Langamba-ACC	beat-NREAL

‘Tomba says, “I will beat Langamba.”’

The pronoun əi ‘I’ in the quoted speech finds its interpretation by referring anaphorically to the proper noun ‘tomba’ that is in the preceding part of the utterance. So, in such cases the first and second person pronouns can be endophorically used. Another illustrative example is given as follows:

IV. ləncenba-nə	korəu-də	hai-k ^h i	əi-nə	nəŋ-gi	məteŋ
Lanchenba-NOM	Korou-LOC	say-DEF	I-NOM	you-GEN	help
paŋ-gəni					

help-NREAL

‘Lanchenba said to Korou, “I will help you.”’

Here the pronoun *ai* ‘I’ and *nəŋ* ‘you’ in the quoted speech are referring respectively to the proper nouns ‘lanchenba’ and ‘korou’. In other words the referents are available within the text itself. So, in this case also the first and second person pronouns are endophorically used.

4. POSSESSIVE PRONOUNS IN REFERENCE

Like personal pronouns the Manipuri possessive pronouns can be used as reference item in constructing a cohesive discourse. They are interpreted by means of the referent somewhere in the discourse. They are doubly anaphoric in the sense that they are both referential and elliptical: they are anaphoric (i) by reference to the possessor and (ii) by ellipsis to the thing possessed (Halliday & Hasan, 1976:55). Some illustrating examples for the above mentioned fact are given as follows:

- V.A- *satrə-siŋ-gi* *ə-pam-bə-du* *mək^hoi-nə*
 student-PL-GEN ATT-like-NMZ-DET they-NOM
k^hənnə-bi-gə-dəbə-ni
 consider-HON-NREAL-obligatory-COP
 ‘They must consider the desire of the students.’
- B- *hoi-ne* *mək^hoi-gi-du* *ai-su* *mərəm cai* *hainə*
 yes-DEC they-GEN-DET I-also reasonable quotative
k^həl-li
 think-PROG
 ‘Yes. I also think that theirs is reasonable.’

Here, in the above given interactive discourse the possessive pronoun *mək^hoigi* ‘their’ presupposes the possessor *satrəsiŋ* ‘students’ by reference and *əpamba* ‘desire’ by ellipsis. Thus, the possessive pronoun ‘*mək^hoigi*’ is doubly anaphoric by reference to ‘*satrəsiŋ*’ and also by ellipsis to the thing possessed ‘*əpamba*’.

One important point to be noted here regarding the sense of doubly anaphoric is that possessive pronouns differ from other personal reference as regards to their anaphoric function. The other personal reference requires only a single referent for their interpretation whereas the possessive pronouns require a possessor and a possessed i.e., at least two referents.

- VI. *məŋal-du* *ai-di* *jum-də* *lai-boi* *niŋ-i* *ma-di*
 Mangal-DET I-PART house-LOC live-ASS wish-SAM he-PAR
mə-jum-də *hən-k^hi-rəm-le*
 PP-house-LOC go back-DEF-COMP-PERF
 ‘I think that Mangal is at home. He had gone back home.’
- VII. *raju-gi* *isai-du* *məjam-nə* *jam* *pam-nə*
 Raju-GEN song-DET people-NOM very like-ADV
ta-nə-k^hi *hai-φ* *tomba-di* *ma-gi-du*
 listen-REC-DEF say-SAM Tomba-PART he-GEN-DET
ta-niŋ-k^hi-de
 listen-mood-DEF-NEG

‘People listen to the song of Raju with great fondness. Tomba did not like to listen to it.’ In the example (vi) the pronoun *ma* ‘he’ has its single referent ‘*məŋal*’ for interpretation. But in the case of (vii), the possessive pronoun *ma-gi* ‘his’ has two referents i.e., the possessor ‘*raju*’ and its possessed *isəi* ‘song’. Both of them contribute a lot in building up a network of line of reference. They have ultimately brought an internal cohesion to the discourse.

5 CONCLUSION

The present study has clearly shown that personal reference has taken a crucial role in making a cohesive Manipuri discourse. Out of the three persons of pronoun only the third person pronoun is contributing a lot in bringing cohesion to a discourse i.e., *ma/məhak* ‘he/she’, *magi/məhakki* ‘his/her’ and *mək^hoi* ‘they’, *mək^hoigi* ‘their’. It is because of the fact that the third person pronouns have found their interpretation only through the antecedent in the text in which they take place. Another interesting point is that in the case of quoted speech the first person pronoun *əi* ‘I’ and *əik^hoi* ‘we’ and the second person pronoun *nəŋ* ‘you’ (sg) and *nək^hoi* ‘you’ (pl) which are actually exophoric have been endophorically used. Thus, personal reference has become a vital cohesive device in a Manipuri discourse.

6. ABBREVIATIONS

ACC	accusative	GEN	genitive	PP	pronominal
prefix					
ADM	adverb of manner	HON	honorific	PROG	progressive
ADV	adverb	LOC	locative	REC	reciprocal
ASS	assertive	NEG	negative	SAM	simple
aspect marker					
ATT	attributive	NMZ	nominalizer	SG	singular
COMP	comparative	NOM	nominative		
COP	copula	NREAL	non realization		
DEC	declarative	PART	particularisation		
DEF	definitive	PERF	perfective		
DET	determiner	PL	plural		

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8. AUTHOR'S BIOGRAPHY

I was born on second March, 1986 at Uchiwa Awang Leikai, Imphal. Right now I am doing Ph.D. on the topic 'Discourse Analysis in Manipuri' in the Department of Linguistics, Manipur University. I had presented different research papers in many different national and international conferences like NEILS 8 & 9, SALA Roundtable-30, ICOLSI-36. I am a lifetime member of the Linguistic Society of India (LSI). My interested research area is semantics and pragmatics.

A Study on Inverse Domination in Graphs

Paper ID	IJIFR/V3/ E11/ 037	Page No.	4157-4166	Subject Area	Mathematics
KeyWords	Inverse Dominating Set, Inverse Domination Number, $\gamma\gamma$ -Sets, Disjoint Dominating Set, $\gamma\gamma$ -Minimum				

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Abstract

Inverse domination number has been determined for some families of graphs such as Andrassai graphs, Prime Complete graphs Book graphs, Shadow graphs, Windmill graphs, Two cycles with common edge and platonic solids. A biproduct of this concept is called as $\gamma\gamma$ -sets are also considered and some families of graphs are proved to be $\gamma\gamma$ -minimum.

1. INTRODUCTION

The concept of the inverse domination number was introduced by Kulli and Sigarkanti [3]. Let D be a dominating set (γ -set) of G . A dominating set D' contained in $V \setminus D$ is called an inverse dominating set of G with respect to D . The smallest cardinality among all minimal dominating sets in $V \setminus D$ is called inverse domination number $\gamma'(G)$. In 2010, Tamizh Chelvam and Grace Perma [4] have characterized graphs with $\gamma(G) = \gamma'(G) = (n-1)/2$. Inverse domination number is already established for the following graphs: complete graphs, complete bi-partite graphs, cycles paths wheel graph, grid graph, corona graphs. In this article we have determined the inverse domination number for some graphs.

Hedetniemi et al. [2] defined and studied the disjoint domination number $\gamma\gamma(G)$ of a graph G . The existence of disjoint dominating sets has been studied by many researchers. In [1] V. Anusuya, R. Kala have already found disjoint dominating sets for the following graphs: wheel graph, helm graph, web graph, grid graph, star graph, trestled graph, paths, cycles. In this article we have found disjoint dominating sets for some graphs and proved them to be $\gamma\gamma$ -minimum.

2. INVERSE DOMINATION FOR SOME FAMILIES OF GRAPHS

2.1 Definition [6]

For any integer $k \geq 1$, let Z_{3k-1} denote the additive group of integer modulo $3k-1$ and let C be the subset of Z_{3k-1} consisting of the elements congruent to 1 modulo 3. The Andrasfai graph is the cayley graph $X(G, C)$ and it is denoted by $\text{And}(k)$.

Let $A_1 = \{x \in V(G) / x \equiv 0 \pmod{3}\}$, $A_2 = \{x \in V(G) / x \equiv 1 \pmod{3}\}$, and

$A_3 = \{x \in V(G) / x \equiv 2 \pmod{3}\}$. Then $|A_1| = k = |A_3|$ and $|A_2| = k-1$.

Note that A_1 , A_2 , and A_3 are independent sets.

2.2 Theorem

$\gamma'(\text{And}(k)) = 3$ for $k \geq 3$.

Proof:

$\text{And}(k)$ is a k -regular graph. Since it has no full degree vertex, $\gamma > 1$.

For $u, v \in V(\text{And}(k))$, $d(u) + d(v) = 2k < 3k-1$, including u and v , we have $2k + 2 < 3k-1$. Hence no two element set can be a dominating set. Therefore $\gamma(\text{And}(k)) > 2$.

Let $D = \{0, 1, 2\}$, $0 \in A_1$, $1 \in A_2$, $2 \in A_3$.

By construction of $\text{And}(k)$, every member of A_2 is adjacent to 0, every member of A_3 is adjacent to 1 and every member of A_1 except 0 is adjacent to 2.

Therefore D is a minimum dominating set. $D' = \{3, 4, 5\} \subseteq V \setminus D$. Therefore D' is an inverse dominating set with respect to D .

Hence $\gamma'(\text{And}(k)) = 3$.

2.3 Definition

Prime complete graph PC_n on n vertices is a graph with $V(PC_n) = \{1, 2, 3, \dots, n\}$ and $E(PC_n) = \{(i, j) / 1 \leq i \neq j \leq n, i, j \text{ are relatively prime}\}$.

2.4 Theorem $\gamma'(PC_n) = 1$.

Proof: Let PC_n be the prime complete graph with n vertices. Let $V = \{1, 2, \dots, n\}$ be the vertex set.

Let $D = \{1\}$. Clearly it is a dominating set of PC_n . Therefore, $\gamma(PC_n) = 1$.

$V - D = \{2, 3, \dots, n\}$. By Bertrand's postulate for every $n > 1$ there is always atleast one

Prime p such that $n < p < 2n$. So there exists a prime p between $n/2$ and n such that

$(p, i) = 1$
 for $1 \leq i \leq n$.

$\{p\} \subseteq V \setminus D$ is an inverse dominating set with respect to D . Hence $\gamma'(PC_n) = 1$.

2.5 Definition

Shadow graph $\text{Sh}(G)$ is obtained by the adjunction of a new vertex v' for each vertex v in G and then joining v' to every neighbour of v in G .

2.6 Theorem $\gamma'(\text{Sh}(K_{1,n})) = n + 1$

Proof. Let $V(\text{Sh}(K_{1,n})) = \{u_{i+1} / i = 0, 1, 2, \dots, n\} \cup \{v_{i+1} / i = 0, 1, 2, \dots, n\}$

and $E(\text{Sh}(K_{1,n})) = \{u_1 u_{i+1}, u_1 v_{i+1} / i = 1, 2, \dots, n\} \cup \{v_1 u_{i+1} / i = 1, 2, \dots, n\}$

$|V(\text{Sh}(K_{1,n}))| = 2n + 2$. There is no full degree vertex. Therefore $\gamma(\text{Sh}(K_{1,n})) > 1$.

Let $D_1 = \{u_1, u_2\}$. u_1 is adjacent to u_{i+1} and v_{i+1} for $i = 1, 2, \dots, n$ and u_2 is adjacent to u_1 and v_1 . Therefore $D_1 = \{u_1, u_2\}$ is a minimum dominating set.

Hence $\gamma(\text{Sh}(k_1, n)) = 2$.

$V \setminus D_1 = \{v_1, v_2, \dots, v_{n+1}\} \cup \{u_3, u_4, \dots, u_n\}$.

Let $S \subset V \setminus D_1$ be a dominating set of $\text{Sh}(k_1, n)$.

v_2, v_3, \dots, v_{n+1} are pendant vertices adjacent to u_1 alone and $u_1 \notin V \setminus D_1$.

Hence any dominating set contained in $V \setminus D_1$ should contain v_2, v_3, \dots, v_{n+1} .

Note also that u_3, u_4, \dots, u_{n+1} are not adjacent to v_i , $i = 2, 3, \dots, n$. So we need atleast one member other than v_2, v_3, \dots, v_{n+1} to dominate these vertices.

Hence $|S| \geq n + 1$.

Inverse dominating set with respect to D_1 should have atleast $n + 1$ elements. Let $D_1' = \{v_{i+1} \mid i=0, 1, 2, \dots, n\}$. v_1 is adjacent to u_2, u_3, \dots, u_{n+1} . The pendant vertices v_2, \dots, v_{n+1} are adjacent to u_1 . Therefore D_1' is an inverse dominating set with respect to D_1 . $\text{Sh}(k_1, n)$ has exactly two γ -sets namely $D_1 = \{u_1, u_2\}$ and $D_2 = \{u_1, v_1\}$.

$D_1' = \{v_1, v_2, \dots, v_{n+1}\} \subseteq V \setminus D_1$ and it is a dominating set. It is also a minimum dominating set with respect to D_1 . Clearly $V \setminus D_2$ does not contain any dominating set of cardinality less than $|D_1'|$. Hence $\gamma'(\text{Sh}(k_1, n)) = n + 1$.

2.7 Definition [6]

The windmill graph $W_d(k, n)$ is an undirected graph constructed for $k \geq 2$ and $n \geq 2$ by joining n copies of the complete graph K_k at a shared vertex.

2.8 Theorem $\gamma'(W_d(k, n)) = n$

Proof. Consider Windmill graph $W_d(k, n)$. It has n copies of complete graph K_k joined at a shared vertex. Let u_0 denoted the shared vertex.

Number of vertices in $W_d(k, n) = (k - 1)n + 1$.

Number of edges in $W_d(k, n) = \frac{nk(k-1)}{2}$.

Let $D = \{u_0\}$. Clearly it is a dominating set. There is no other full degree vertex in $W_d(k, n)$. Therefore D is the unique minimum dominating set. Vertices of one copy except u_0 are not adjacent to vertices in any other copy. So we need atleast one vertex in each copy in any inverse dominating set with respect to D . Since each copy is a complete graph, it is enough to take one vertex from each copy.

Hence $\gamma'(W_d(k, n)) = n$.

2.9 Definition [5]

The m -book graph is defined as the graph cartesian product $S_{m+1} \times P_2$ where S_{m+1} is a star graph and P_2 is the path graph on two nodes. The generalization of the book graph to n stacked pages is the (m, n) -stacked book graph. It is denoted by B_n^k , where n is number of pages and each page is a k sided polygon.

2.10 Theorem $\gamma'(B_n^k) = 1$.

Proof. Let $V(B_n^3) = \{u_0, u_1, \dots, u_n\}$ and $E(B_n^3) = \{u_0v_1\} \cup \{u_0u_2, u_1u_2, \dots, u_0u_n, u_1u_n\}$. Let $D = \{u_0\}$. Clearly it is a dominating set. Therefore $\gamma(B_n^3) = 1$. $V - D = \{u_1, u_2, \dots, u_n\}$. $D = \{u_1\}$ is an inverse dominating set with respect to D .

Hence $\gamma'(B_n^3) = 1$.

2.11 Theorem $\gamma'(B_n^4) = n$.

Proof. Let $V(B_n^4) = \{u_0, u_1, \dots, u_n, v_0, v_1, \dots, v_n\}$ and

$$E(B_n^4) = \{u_i v_i : i = 0, 1, \dots, n\} \cup \{u_0 u_i, v_0 v_i : i = 1, 2, \dots, n\}.$$

Number of vertices in $B_n^4 = 2n + 2$.

Number of edges in $B_n^4 = 3n + 1$.

Let $D = \{u_0, v_0\}$. Clearly it is a dominating set. There is no vertex in B_n^4 with degree $2n + 1$. Therefore, $\gamma(B_n^4) > 1$. Hence D is a minimum dominating set. $V - D = \{u_1, v_1, u_2, v_2, \dots, u_n, v_n\}$. The set $D' = \{u_1, v_2, u_3, v_4, \dots, u_{n-1}, v_n\}$. u_1 is dominated by u_0 and v_1, v_2 are dominated by v_0 and u_2 . Then u_i is dominated by v_i for $i=3,4,\dots,n$.

Therefore D' is a inverse dominating set. In order to cover u_i and v_i , one of them must be taken in any dominating set for $1 \leq i \leq n$. Note also that $\{u_0, v_0\}$ is the unique minimum dominating set. Hence $\gamma'(B_n^4) = n$.

2.12 Definition

Let $G_{2,n}$ denote the graph consisting of two cycles each of size n with a shared edge.

Dominating sets as well as inverse dominating sets of $G_{2,n}$ are listed below.

For $n = 3$

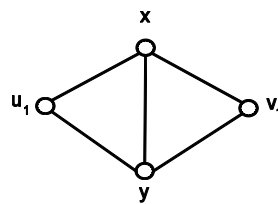


Figure 2.1: Inverse dominating set of two cycles with common edge for $n=3$

γ -set $D = \{x\}$. Inverse dominating set $D' = \{y\}$

For $n = 4$

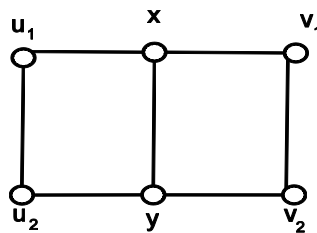


Figure 2.2: Inverse dominating set of two cycles with common edge for $n=4$

γ -set $D = \{x, y\}$. Inverse dominating set $D' = \{v_1, u_2\}$

For $n = 5$

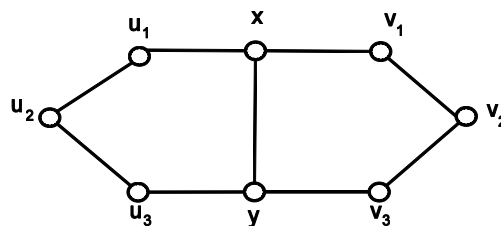


Figure 2.3: Inverse dominating set of two cycles with common edge for $n=5$

γ -set $D = \{x, u_2, v_3\}$. Inverse dominating set $D' = \{u_1, y, v_2\}$

For $n = 6$

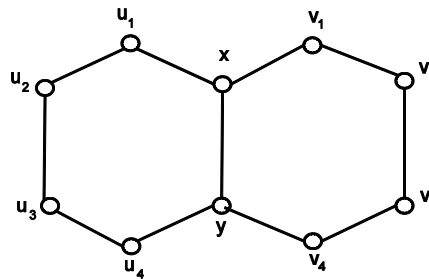


Figure 2.4 : Inverse dominating set of two cycles with common edge for n=6
 γ -set $D = \{x, u_3, v_3\}$. Inverse dominating set $D' = \{u_2, y, v_2\}$ For $n = 7$

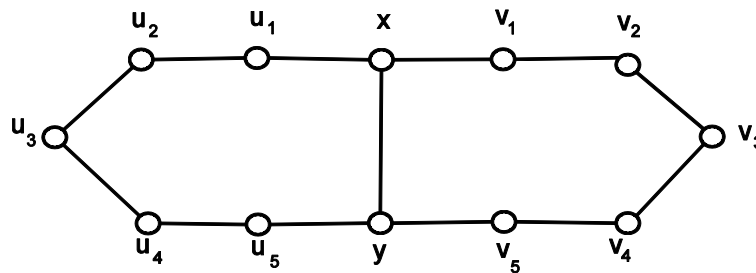


Figure 2.5 : Inverse dominating set of two cycles with common edge for n=7
 γ -set $D = \{x, u_3, y, v_3\}$. Inverse dominating set $D' = \{u_1, u_4, v_2, v_5\}$
For $n = 8$

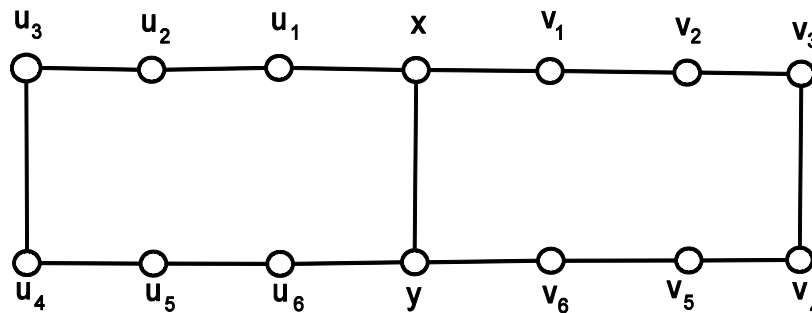


Figure 2.6 verse dominating set of two cycles with common edge for n=8

γ -set $D = \{x, u_3, u_6, v_2, v_5\}$. Inverse dominating set $D' = \{u_1, u_4, y, v_4, v_1\}$ or $n = 9$

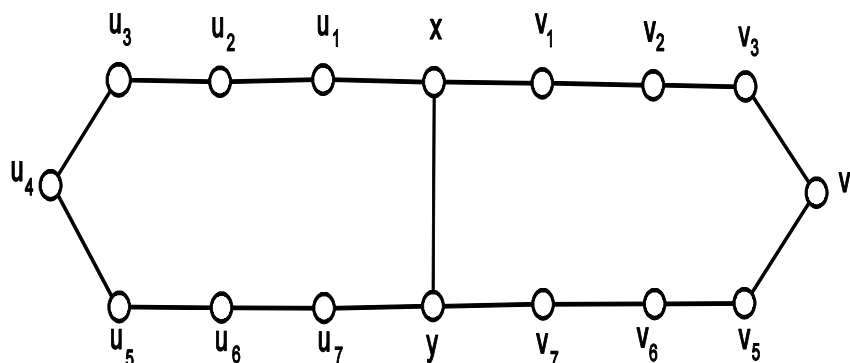


Figure 2.7 : Inverse dominating set of two cycles with common edge for n=9
 γ -set $D = \{u_1, u_4, u_7, v_1, v_3, v_6\}$. Inverse dominating set $D' = \{x, u_2, u_5, y, v_2, v_5\}$
For $n = 10$

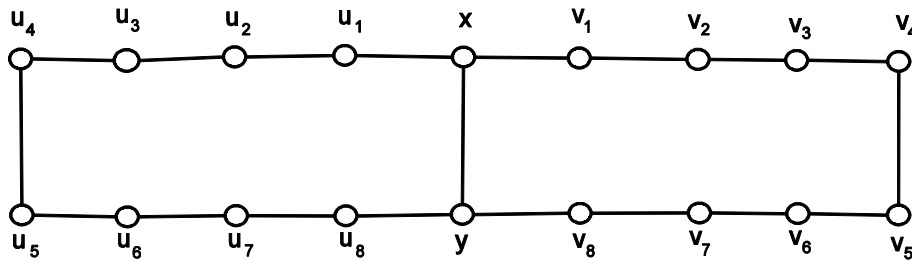


Figure 2.8 : Inverse dominating set of two cycles with common edge for $n=10$
 γ -set $D = \{x, u_3, u_6, y, v_3, v_6\}$. Inverse dominating set $D' = \{u_1, u_4, u_7, v_2, v_5, v_8\}$
 For $n = 11$

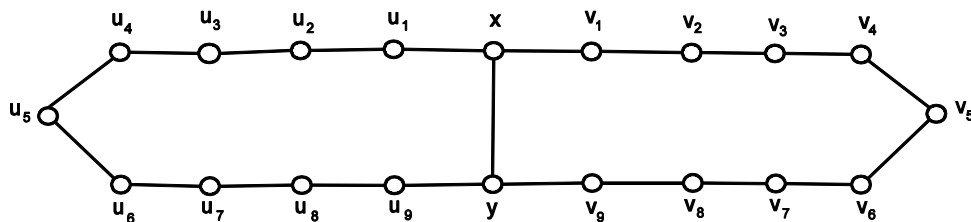


Figure 2.9 : Inverse dominating set of two cycles with common edge for $n=11$
 γ -set $D = \{x, u_3, u_6, u_9, v_2, v_5, v_8\}$.
 Inverse dominating set $D' = \{u_1, u_4, u_7, y, v_1, v_4, v_7\}$
 For $n = 12$

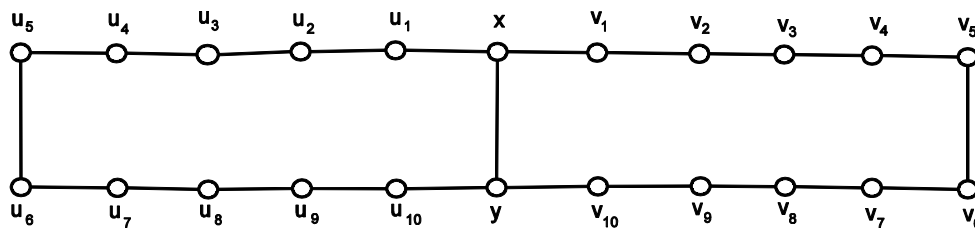


Figure 2.10 : Inverse dominating set of two cycles with common edge for $n=12$
 γ -set $D = \{x, u_3, u_6, u_9, v_3, v_6, v_9\}$.
 Inverse dominating set $D' = \{u_2, u_5, u_8, y, v_2, v_5, v_8\}$.
 Hence we conclude that $\gamma(G_{2,n}) = \gamma'(G_{2,n}) = \lceil \frac{2n-2}{3} \rceil$ if $n \not\equiv 0 \pmod{3}$ and
 $\lfloor \frac{2n-2}{3} \rfloor$ if $n \equiv 0 \pmod{3}$.

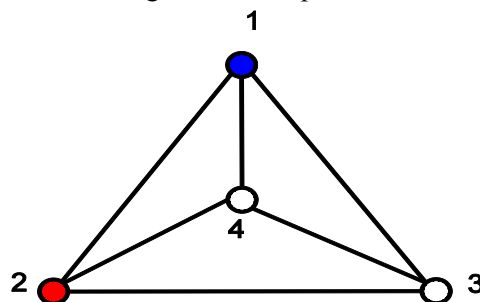
2.13 Theorem $\gamma'(\text{Tetrahedron}) = 1$

Proof. Tetrahedron is a 3-regular graph with 4 vertices. Let $D = \{1\}$.

Clearly it is a dominating set. Therefore $\gamma(\text{Tetrahedron}) = 1$.

$V \setminus D = \{2, 3, 4\}$. $D' = \{2\}$ is an inverse dominating set with respect to D . Hence

$\gamma'(\text{Tetrahedron}) = 1$.



2.14 Theorem $\gamma'(Cube) = 2$

Proof. Cube is a 3-regular graph with 8 vertices. Let $D = \{1, 6\}$. Clearly it is a dominating set. For any Graph G , $\lceil \frac{n}{1+\Delta(G)} \rceil \leq \gamma(G) \leq n-\Delta(G)$. $\lceil \frac{8}{1+3} \rceil = 2$.

Hence $\gamma(Cube) \geq 2$. Hence $\gamma(Cube) = 2$.

$V \setminus D = \{2, 3, 4, 5, 7, 8\}$. $D = \{2, 7\}$ is an inverse dominating set with respect to D . Hence $\gamma'(Cube) = 2$.

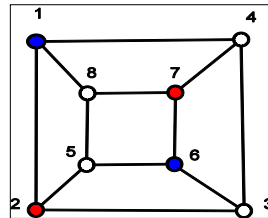


Figure 2.11 : Inverse dominating set of Cube

2.15 Theorem $\gamma'(Octahedron) = 2$

Proof. Octahedron is a 4-regular graph with 6 vertices. Let $D = \{1, 6\}$. Clearly it is a dominating set. There is no vertex in octahedron with degree 5. Therefore $\gamma(Octahedron) > 1$.

D is a minimum dominating set. $V \setminus D = \{2, 3, 4, 5\}$. Any two vertices of $V \setminus D$ is an inverse dominating set. Hence $\gamma'(Octahedron) = 2$.

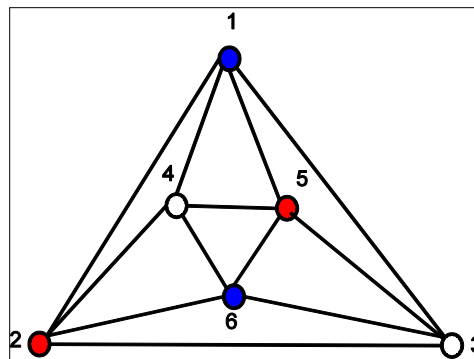


Figure 2.12 : Inverse dominating set of Octahedron

2.16 Theorem $\gamma'(Icosahedron) = 2$

Proof. Icosahedron is a 5-regular graph with 12 vertices. Let $D = \{1, 4\}$. Clearly it is a dominating set. For any Graph G , $\lceil \frac{n}{1+\Delta(G)} \rceil \leq \gamma(G) \leq n-\Delta(G)$. $\lceil \frac{12}{1+5} \rceil = 2$.

$\gamma(Icosahedron) \geq 2$.

Therefore D is a minimum dominating set. Hence $\gamma(Icosahedron) = 2$.

$V \setminus D = \{2, 3, 5, 6, 7, 8, 9, 10, 11, 12\}$. $D' = \{7, 10\}$ is an inverse dominating set with respect to D . Hence $\gamma'(Icosahedron) = 2$.

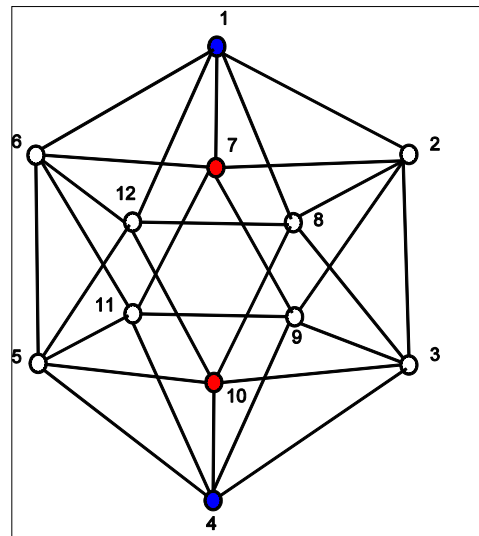


Figure 2.13 : Inverse dominating set of Icosahedron

3. DISJOINT DOMINATING SETS

3.1 Definition

We say that a graph G is $\gamma\gamma$ -minimum if it has two disjoint dominating sets (γ -sets), that is, $\gamma\gamma(G) = 2\gamma(G)$. Similarly, a graph G is called $\gamma\gamma$ -maximum if $\gamma\gamma(G) = n$.

3.2 Theorem Prime complete graphs PC_n are $\gamma\gamma$ -minimum.

Proof. By theorem 3.4, we have $\gamma(PC_n) = 1 = \gamma'(PC_n)$

$\gamma\gamma(PC_n) = 2 = 2\gamma(PC_n)$. Hence PC_n are $\gamma\gamma$ -minimum.

3.3 Theorem Andrasfai graphs $And(k)$ are $\gamma\gamma$ -minimum

Proof. By theorem 3.2, we have $\gamma(And(k)) = 3 = \gamma'(And(k))$ Therefore $\gamma\gamma(And(k)) = 6 = 2\gamma(And(k))$. Hence $And(k)$ are $\gamma\gamma$ -minimum.

3.4 Theorem Book graphs B_n^3 are $\gamma\gamma$ -minimum.

Proof. By theorem 3.7, we have $\gamma(B_n^3) = 1 = \gamma'(B_n^3)$. Therefore $\gamma\gamma(B_n^3) = 2 = 2\gamma(B_n^3)$.

Therefore B_n^3 are $\gamma\gamma$ -minimum.

3.5 Theorem Books with pentagonal pages B_n^5 are $\gamma\gamma$ -minimum.

Proof . Let $V(B_n^5) = \{v_1, v_2, \dots, v_{3n+2}\}$ and $E(B_n^5) = \{v_1 v_{3r+2}/r = 1, 2, \dots, n\} \cup$

$$\{v_2 v_{3r}/r = 1, 2, \dots, n\} \cup \{v_{3r} v_{3r+1}, v_{3r+1} v_{3r+2}/r = 1, 2,$$

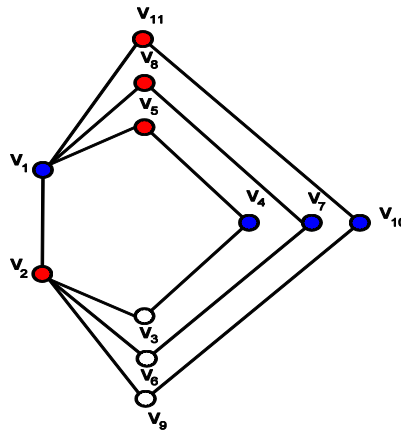
$\dots, n\}$.

It can be easily verified that $\gamma(B_n^5) = n+1$.

Let $D = \{1, 4, 7, \dots, 3n+1\}$ and $D' = \{2, 5, 8, \dots, 3n+2\}$. D' is also a γ -set.

D and D' are disjoint minimum dominating sets. Therefore $\gamma\gamma(B_n^5) = 2n+2 = 2\gamma(B_n^5)$.

Hence B_n^5 are $\gamma\gamma$ -minimum.



3.6 Theorem Let G_n denote the graph consisting of two cycles each of size n with a shared vertex. Then

1. $\gamma(G_n) = 1 + \lceil \frac{n-3}{3} \rceil$
2. $\gamma'(G_n) = 1 + \lceil \frac{n-3}{3} \rceil + \lceil \frac{n-1}{3} \rceil$
3. G_n is $\gamma\gamma$ -minimum iff $n \equiv 1 \pmod{3}$

Proof. Let $V(G_n) = \{x, u_i, v_i / i=1, 2, \dots, n-1\}$ and $E(G_n) = \{u_i u_{i+1}, v_i v_{i+1} / i=1, 2, \dots, n-2\} \cup \{x u_1, u_{n-1} x, x v_1, v_{n-1} x\}$. Let D be a dominating set.

Case 1: Let $x \in D$.

x covers four vertices namely $u_1, u_{n-1}, v_1, v_{n-1}$. $G_n' = G_n \setminus \{x, u_1, u_{n-1}, v_1, v_{n-1}\}$ is the disjoint union of two paths each with $n-3$ vertices. $\gamma(G_n') = 2 \lceil \frac{n-3}{3} \rceil$.

Therefore $|D| \geq 1 + 2 \lceil \frac{n-3}{3} \rceil$. (1)

Case 2: Let $x \notin D$

x should be covered by one member from $\{u_1, u_{n-1}, v_1, v_{n-1}\}$. Without loss of generality, let $u_1 \in D$. Consider $G_n' = G_n \setminus \{x, u_1, u_2\}$. G_n' is the disjoint union of two paths u_3, u_4, \dots, u_{n-1} and v_1, v_2, \dots, v_{n-1} .

$\gamma(G_n') = \lceil \frac{n-3}{3} \rceil + \lceil \frac{n-1}{3} \rceil$. Therefore $|D| \geq 1 + \lceil \frac{n-3}{3} \rceil + \lceil \frac{n-1}{3} \rceil$. (2)

From (1) and (2), it follows that any minimum dominating set should contain x and $\gamma(G_n) = 1 + 2 \lceil \frac{n-3}{3} \rceil$. Inverse dominating set does not contain x and hence $\gamma(G_n') = 1 + \lceil \frac{n-3}{3} \rceil + \lceil \frac{n-1}{3} \rceil$.

Claim: $\lceil \frac{n-3}{3} \rceil = \lceil \frac{n-1}{3} \rceil \Leftrightarrow n \equiv 1 \pmod{3}$

Proof:

Subclaim 1: $n \equiv 0 \pmod{3}$

Let $n = 3m$.

$$\lceil \frac{n-3}{3} \rceil = \lceil \frac{3m-3}{3} \rceil = m-1$$

$$\lceil \frac{n-1}{3} \rceil = \lceil \frac{3m-1}{3} \rceil = m$$

Subclaim 2: $n \equiv 1 \pmod{3}$

Let $n = 3m+1$.

$$\lceil \frac{n-3}{3} \rceil = \lceil \frac{3m+1-3}{3} \rceil = m$$

$$\left\lceil \frac{n-1}{3} \right\rceil = \left\lceil \frac{3m+1-1}{3} \right\rceil = m$$

Subclaim 3: $n \equiv 2 \pmod{3}$

Let $n = 3m+2$.

$$\left\lceil \frac{n-3}{3} \right\rceil = \left\lceil \frac{3m+2-3}{3} \right\rceil = m$$

$$\left\lceil \frac{n-1}{3} \right\rceil = \left\lceil \frac{3m+2-1}{3} \right\rceil = m$$

$$\text{Hence } \left\lceil \frac{n-3}{3} \right\rceil = \left\lceil \frac{n-1}{3} \right\rceil \Leftrightarrow n \equiv 1 \pmod{3}.$$

$$\text{Therefore } \gamma(G_n) = \gamma(G_n') \Leftrightarrow n \equiv 1 \pmod{3}.$$

Hence G_n is $\gamma\gamma$ -minimum iff $n \equiv 1 \pmod{3}$.

6. BIOGRAPHIES



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Adventure Tourism By Trekking : Destination Pune Forts

Paper ID

IJIFR/V3/ E11/ 043

Page No.

4167-4180

Subject Area

Tourism
Management

KeyWords

Club, Fort, Guide, Mountains, Tourist, Trek

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Abstract

The main aim of this research is to find out the potential use of forts for trekking. Pune forts are the historical symbol for the Maharashtra. There are various types of forts situated in every location of Pune. Most of the forts are built-up on Mountains. Forts are built up in such a way that it attracts the people to come again and again for visit. The researcher has selected tourist as a target group to carry out this research and local community people. The researcher summoned up this research by gathering the data about types of clientele who frequently visit the forts. The respondents are mainly classified as per age, gender, income level, leisure time, likes and dislikes of them. People prefer to visit forts as per seasons also. There is number of tourist who wanted to visit forts for trekking but due to lack of facility i.e. , accessibility, transportation, food, technology, guide facility, parking facility, shops for purchasing trekking equipment and accessories in emergency, they avoid to visit forts for trekking. No proper safety and security at the place of forts. No emergency services are available nearby forts. However tourists visit forts again and again to various forts for trekking in Pune. Most of the information collected through trekking clubs of Pune. This research paper would help to all the students, teachers, scholars and the Government.

1. INTRODUCTION

Pune is considered the cultural capital of Maharashtra. Pune, a sprawling city in the Indian state of Maharashtra, was once the base of the Peshwas (prime ministers) of the Maratha Empire. It's known for the grand Aga Khan Palace, built in 1892 and now a memorial to

Mahatma Gandhi, whose ashes are preserved in the garden. The 8th-century Pataleshwar Cave Temple is dedicated to the Hindu god Shiva.

Pune is famous for many-a-thing ranging from local cuisine, warm-hearted people, solid education platform, and a vibrant cosmopolitan culture. This first capital of the Maratha Empire makes for a brilliant base to explore some of the finest outdoor trails in India too. The city even now takes pride in presenting many forts tucked away at locations that attract ardent trekkers to not just relive the history of the powerful Marathas and Peshwas, but also a chance to absorb the wonderful natural environment. Pune is not only popular for its heritage close to the city but also there are amazing getaways for adventure enthusiasts and trekkers.

2. NEED OF THE STUDY

Today's generations are more attracted towards trekking to mountains. They always seek for new challenges for adventure. The need of this research is to know the awareness about forts for trekking. Tourist and people are known the forts tourism or not. This type of research helps to spread and collect the importance of forts for trekking. Fort is one of the categories of tourism, which can be used for trekking also. This study is basically carried out for getting information and views of tourist about forts for trekking.

3. DEFINITIONS

- i.) **Fort:** A strong or fortified place occupied by troops and usually surrounded by walls, ditches, and other defensive works; a fortress; fortification. Any permanent army post. (Formerly) a trading post.
- ii.) **Trek:** To travel or migrate, especially slowly or with difficulty. a journey or trip, especially one involving difficulty or hardship
- iii.) **Adventure:** An exciting or very unusual experience, participation in exciting undertakings or enterprises, the spirit of adventure, a bold, usually risky undertaking; hazardous action of uncertain outcome, a commercial or financial speculation of any kind; venture.

4. SCOPE OF THE STUDY

Scope of the study is to consider the maximum use of isolated forts to come in the category of trekking forts. To increase the flow of mass tourist who can frequently visit forts for trekking. The researcher will focus on searching the information and solutions on the better use of forts for trekking, which would be cost effectiveness and environmental sustainability, for the forts management process.

5. REVIEW OF LITERATURE

- **Dilip Merala (2016)** Trekking and summer might not go hand in hand for those who think of it as a monsoon or winter activity. It is understandable. Not everyone likes to risk getting sun burnt, exhausted, or dehydrated. However, with some basic levels of physical fitness and endurance against the hot Indian summer, there

are some incredible trekking trails in Maharashtra that you can try on your days off. Here are 5 easy treks for trekkers who are not bothered by heat and sweat. Rajmachi Fort, Lohgad Fort, Tikona Fort, Ratangad Fort, **Vikatgad Fort**, Torna Fort.

- **Karan Chawda (2016)** as per the author, Kavnai Fort is a hidden beauty in Nashik waiting to be explored! With a commanding view of the surrounding villages and also a lake on top, it's a well-rounded trek that can satisfy your thirst for weekend travel! **Karan Chawda** chose this trek as his 50th trek in the Sahyadris and he decided to begin documenting his treks as well! So here it is – the Kavnai Fort Trek. Document a lot more trails in the coming years.
- **Aashish Chawla (2012)** Aashish is a wandering soul who loves to travel deep and offbeat, trying to connect with rivers, mountains, wilderness, people and cultures. He loves trekking and lands up on some Sahyadri trail almost every weekend. Writing and meeting new people always excites him to no end. He emphasize on forts for trekking. He believes that forts are also a good destination for trekking.
- **Ruzbeh Billimoria (2003)** author had gone for a trekking to the prabalgad fort in Panvel region. In this trekking she had observed various sides of the forts with various types of stones used for fort. Different signs are used to go towards the fort. Again there are so many rock cut caves also available for the tourist as a bonus with trekking. She observed that the trekking on Prabalgad fort is a bit steep. There are various rocky walls which are straight in nature. It's very difficult to climb easily.

6. OBJECTIVES OF THE STUDY

- I. To study the potential use of Pune forts as a trekking destination.
- II. To find the type of clientele who visit forts for trekking.
- III. To analyse the likes and dislikes of tourist for trekking towards the forts.
- IV. To explore the ways to increase the significance of forts as a trekking destination.

7. HYPOTHESIS

- 01- Pune forts are not popular for a trekking destination
H1 – Pune forts are popular for a trekking destination
02 – Pune forts are not good for trekking.
H2 – Pune forts are good for trekking.

8. RESEARCH METHODOLOGY

I. Sampling Frame

For this study the researcher would be collecting the information from various tourists who frequently visit forts for trekking. He would also gather the data from various trekking clubs of Pune, who regularly organise trips of trekking on forts of Pune Region.

II. Sources of Data

- **Primary data** shall be collected from the universe mentioned above. For the purpose of interviews samples representing the various renowned Clubs of trekking in Pune region. Tourists are the nerve part tourism industry. Maximum data shall be collected from the tourists who frequently visit the forts for trekking.
- **Secondary data** shall be collected from published/unpublished literature on Forts management practices in the tourism industry, latest references available from the journals, newspapers, research publications and magazines, and other relevant sources like internet.

III. **Public Relations:**

This study would also help to create a public relation with various types of tourist, who regularly visit the forts of Pune Region. There are various types of patrons who like to visit the forts on various reasons. This study process would also develop a relationship for awareness of history and preservation of forts among the tourist. People would come to know more about forts as a tourist destination for trekking in details as well as its importance in tourism industry.

9. OBSERVATIONS AND DISCUSSIONS

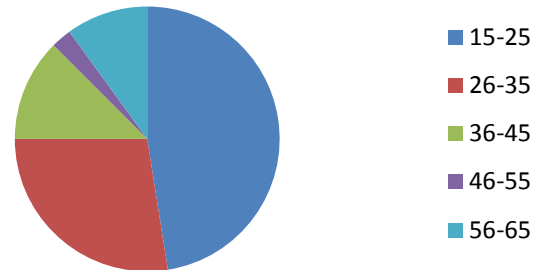
The researcher has observed that respondents are more aware about the forts and trekking. He came to know about the various problems and challenges which face the tourist and people for going on forts. People are having different views and suggestions for the forts as adventure tourism. As per the discussion with various types of clientele from the age of 15 to 55 different types of thoughts came out. As per the information collected by the people, male ratio is higher than the female ratio. Single people are more interested than married for trekking. Students and salaried people are more into trekking now a days. Most of the people are spending their vacation and leisure time by travelling and trekking to mountains and forts.as per the data collected by the researcher. Most of the respondents have said that they are known about various forts in and around Pune. Respondents are known for most of the forts in and around Pune. Maximum people said forts are all season destination for trekking.as per the research researcher come to know that the accommodation provided for the trekker is good nearby forts. According to the respondents safety and security are provided well near forts. People felt that availability of healthy food is one of the aspects to attract the trekkers to fort. Most of the respondents are said that guide facility is available at forts. Respondents are not satisfied for the emergency medical services provided at the forts for trekkers. People are not agree that shops for all emergency equipment and accessories of trekking are available for trekkers at the forts. People shoed the interest saying that the frequency of local as well as other transport is good for trekkers nearby forts. Maximum respondents think that the forts are the best destination for trekking.

10. DATA ANALYSIS & INTERPRETATION

A) Age Group?

Age	Respondents
15-25	19
26-35	11
36-45	5
46-55	1
56-65	4

Respondents



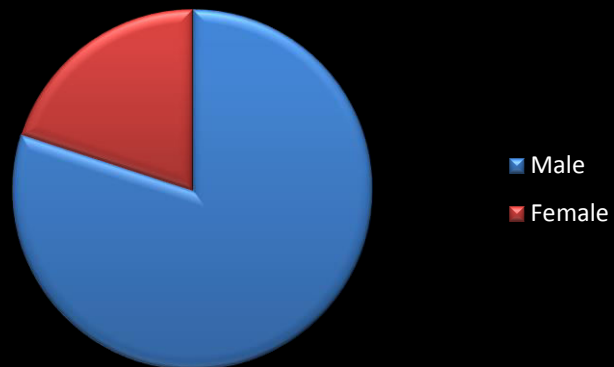
Interpretation:-

As per the findings for the respondents as per age maximum people are varies above 18 years old. Who prefer to go for trekking as compared with maximum age holders.

B) Gender

Gender	Respondents
Male	32
Female	8

Respondents



Interpretation: - As per the interpretation of the tourist and visitors for the trekking male count is higher than the women.

C) Marital Status

Marital Status	Respondents
Single	22
Married	18

Respondents

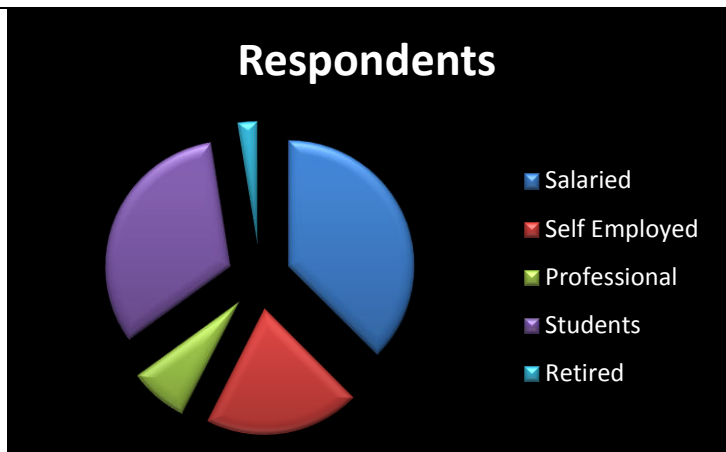


Interpretation:-

Single tourist/visitors are more interested for visiting forts for trekking.

Q.1) What is your occupation?

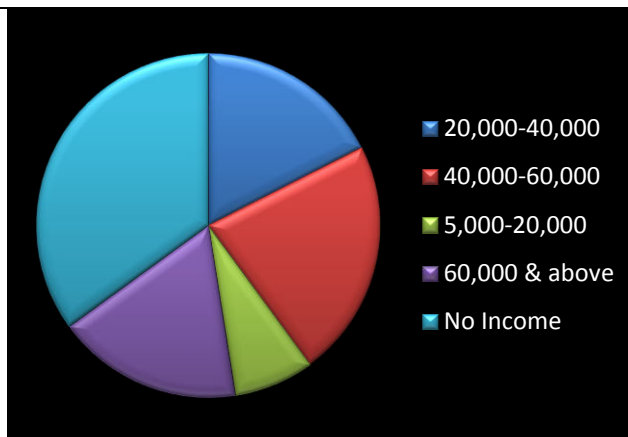
Occupation	Respondents
Salaried	15
Self Employed	8
Professional	3
Students	13
Retired	1



Interpretation:- As per the survey by the researcher salaried and students are more into trekking than other occupational people.

Q.2) What is your income level?

Income Level	Respondents
20,000-40,000	7
40,000-60,000	9
5,000-20,000	3
60,000 & above	7
No Income	14

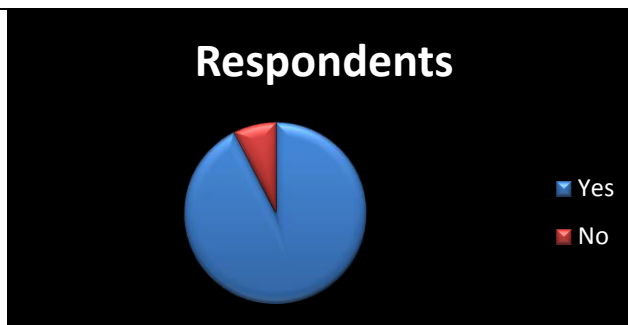


Interpretation:-

Maximum people/tourist are not having any income source but still they prefer to go for trekking

Q.3) Do you get any vacation/leisure time?

Vacation/Leisure	Respondents
Yes	37
No	3

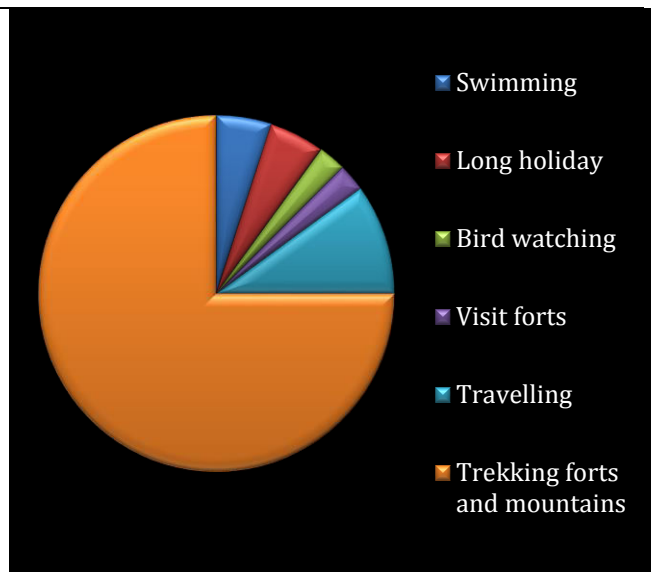


Interpretation:-

As per the interpretation of the data maximum people/tourist are getting vacation and leisure time.

Q.4) How do you spend your vacation/holiday?

Vacation/Holiday	Respondents
Swimming	2
Long holiday	2
Bird watching	1
Visit forts	1
Travelling	4
Trekking forts and mountains	30

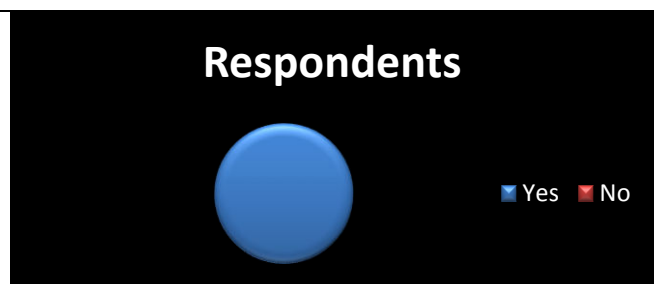


Interpretation:

Most of the people/tourist spends their time by visiting forts and mountains for trekking.

Q.5) Are you aware about trekking?

Aware about trekking	Respondents
Yes	40
No	0

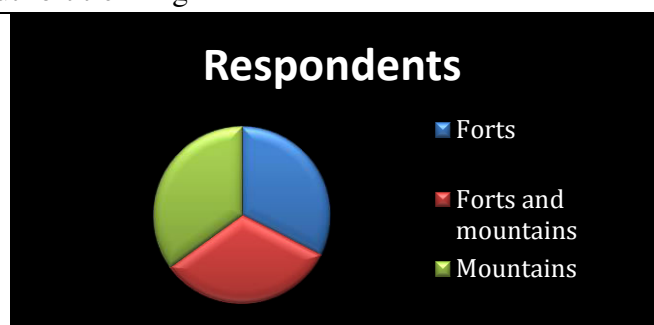


Interpretation:

All the tourist and/people are aware about fort trekking

Q.6) Given a choice, which place you prefer for trekking?

Place to prefer	Respondents
Forts	13
Forts and mountains	13
Mountains	14

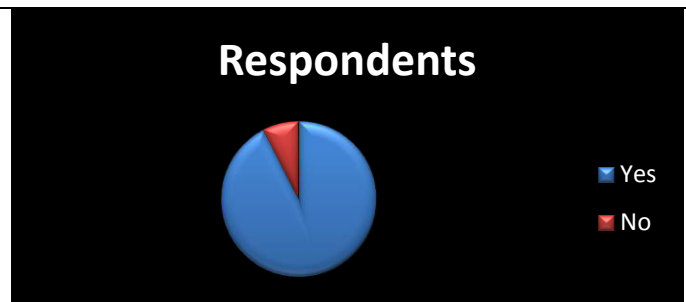


Interpretation:

Forts and mountains are the most preferable spots for trekking as per the data received.

Q.7) Are you aware of the forts for trekking in and around Pune?

Aware about forts	Respondents
Yes	37
No	3

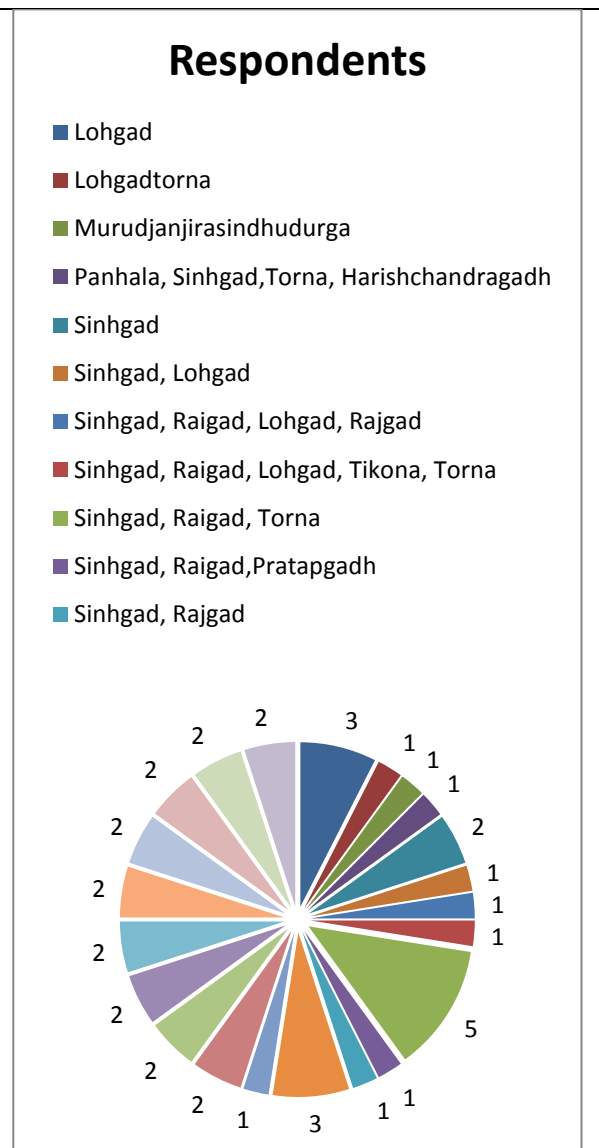


Interpretation:

People and tourist are more aware about forts trekking in and around Pune.

Q.8) Which forts?

Forts	Respondents
Lohgad	3
Lohgad torna	1
Murudjanjirasindhudurga	1
Panhala, Sinhgad, Torna, Harishchandragadh	1
Sinhgad	2
Sinhgad, Lohgad	1
Sinhgad, Raigad, Lohgad, Rajgad	1
Sinhgad, Raigad, Lohgad, Tikona, Torna	1
Sinhgad, Raigad, Torna	5
Sinhgad, Raigad, Pratapgadh	1
Sinhgad, Rajgad	1
Sinhgad, Rajgad, Torna	3
Sinhgad, Ramchandra fort	1
Sinhgad, Torna	2
Sinhgad, Lohgad	2
Sinhgad, Raigad, Lohgad, Rajgad	2
Sinhgad, Raigad, Lohgad, Tikona, Torna	2
Sinhgad, Raigad, Torna, Lohgad	2
Sinhgad, Shivneri, Ajinkyatara fort	2
Sinhgad, Shivneri, fort, Torna	2
Sinhgad, Tikona, Lohgad, Purandar, Rajgad	2
Vishalgadh, Raigad, Rajmachi	2

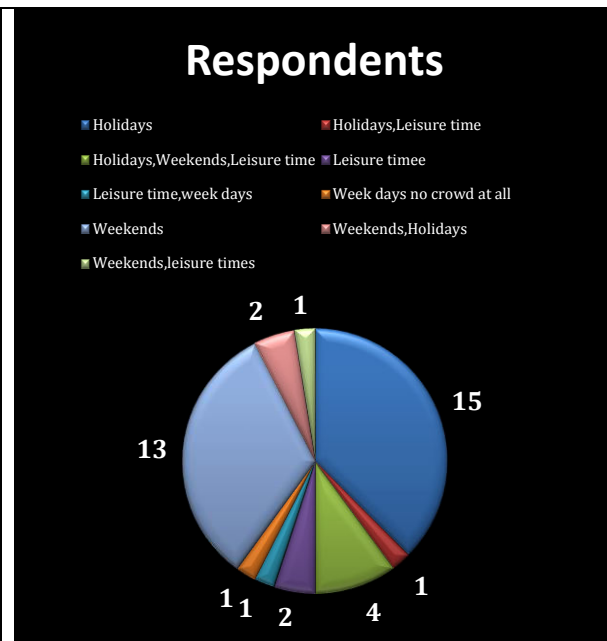


Interpretation :

Maximum people showed equal interest and emphasize on all the forts, as per the data.

Q.9) What time will you allot for trekking to fort?

Time for Trekking	Respondents
Holidays	15
Holidays,Leisure time	1
Holidays,Weekends ,Leisure time	4
Leisure timeee	2
Leisure time,week days	1
Week days no crowd at all	1
Weekends	13
Weekends,Holidays	2
Weekends,leisure times	1

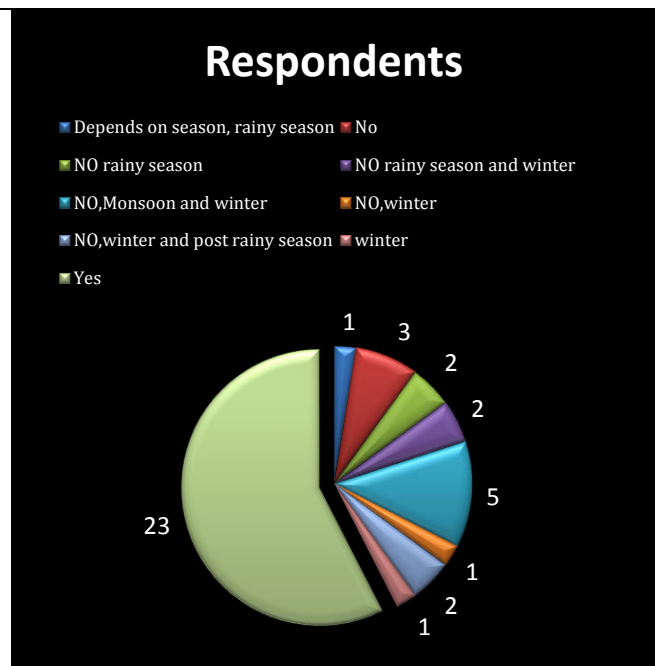


Interpretation:

Holidays and leisure time are the two factors which are responsible for trekking.

Q.10) Do you consider fort as all season destinations for trekking? If no, which season do you think is most suitable for trekking to fort?

All season destination	Respondents
Depends on season, rainy season	1
No	3
NO rainy season	2
NO rainy season and winter	2
NO,Monsoon and winter	5
NO,winter	1
NO,winter and post rainy season	2
winter	1
Yes	23



Interpretation :

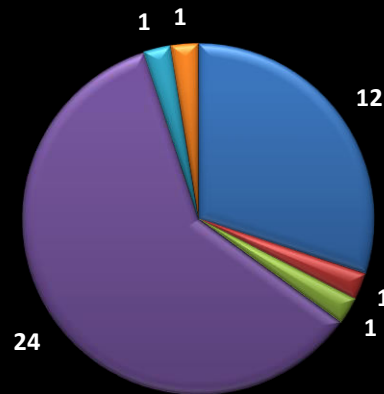
Most of the people/tourist is agree for forts are all season destinations for trekking and monsoon and winter are the best season for trekking.

Q.11) Are you satisfied for the accommodation provided for trekkers nearby forts? If no

Satisfaction for accommodation	Respondents
No	12
NO Stay in temple or tents	1
NO,we do our own provision	1
Yes	24
Yes,carry our tents	1
Other	1

Respondents

- No
- NO Stay in temple or tents
- NO,we do our own provision
- Yes
- Yes,carry our tents
- Other



Interpretation :

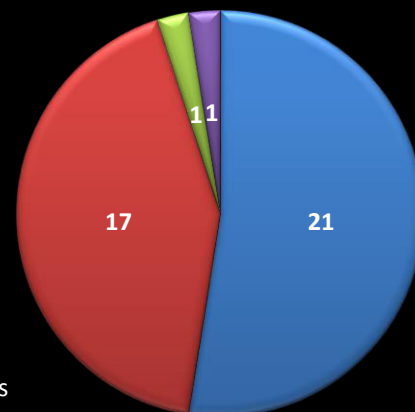
Maximum respondents said that accommodation is provided for trekkers nearby forts

Q.12) Do you feel that the safety and security is good at the fort for trekkers? If no

Safety and Security	Respondents
Yes	21
No	17
NO ropes should be there and medical facility	1
NO, no wardens are present	1

Respondents

- Yes
- No
- NO ropes should be there and medical facility
- NO, no wardens are present



Interpretation :

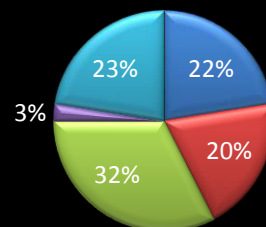
Maximum respondents emphasize on safety and security is good at the fort for trekkers

Q.13) Do you agree that parking facility is good at the forts?

Parking Facility	Respondents
Agree	9
Disagree	8
Neither agree or disagree	13
Strongly agree	1
Strongly disagree	9

Respondents

■ Agree ■ Disagree
■ Neither agree or disagree ■ Strongly agree
■ Strongly disagree



Interpretation :

32% people are neither agreed or disagree for the parking facility at the fort.

Q.14) Do you feel that availability of healthy food is one of the aspect to attract the trekkers to fort?

Availability of healthy food	Respondents
Yes	23
No	17

Respondents

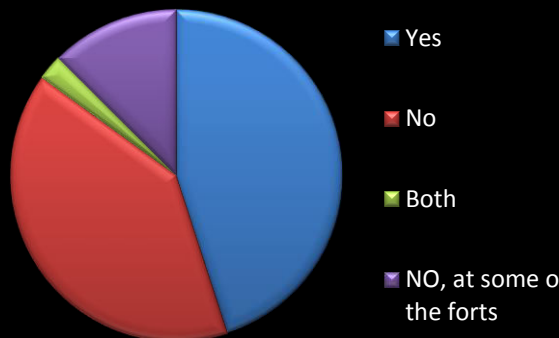


Interpretation: More no. Of respondents felt that availability of healthy food is one of the aspects to attract the trekkers to fort.

Q.15) Do you agree that guide facility is available for trekkers at the forts?

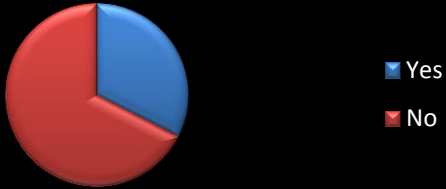
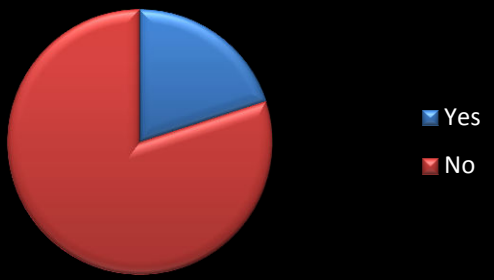
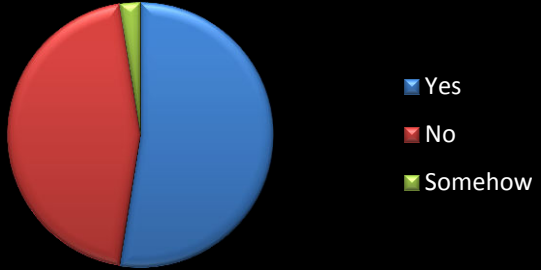
Guide Facility	Respondents
Yes	18
No	16
Both	1
NO, at some of the forts	5

Respondents



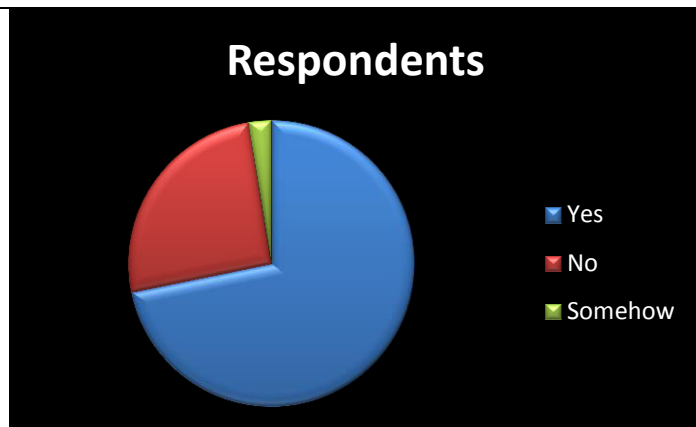
Interpretation :

Respondents are agreed for guide facility is available for trekkers at the forts in more nos.

Q.16) Are you satisfied for the emergency medical services provided at the forts for trekkers?		
Emergency Medical Services	Respondents	
Yes	13	
No	27	
Interpretation : Most of the respondents are not satisfied for the emergency medical services provided at the forts for trekkers		
Q.17) Do you agree that shops for all emergency equipment and accessories of trekking are available for trekkers at the forts?		
Emergency Equipment and accessories	Respondents	
Yes	8	
No	32	
Interpretation : Respondents are not agreeing for the emergency equipment and accessories of trekking for trekkers at the forts.		
Q.18) Are you satisfied the kind of mobile tower and internet facility is available for trekkers at the forts?		
Mobile tower and internet facility	Respondents	
Yes	21	
No	18	
Somehow	1	
Interpretation : Researcher can say that maximum no. respondents are satisfied for the mobile tower and internet facility is available for trekkers at the forts.		

Q.19) Do you agree that the frequency of local as well as other transport is good for trekkers nearby forts?

Frequency of local transport	Respondents
Yes	28
No	10
Somehow	1

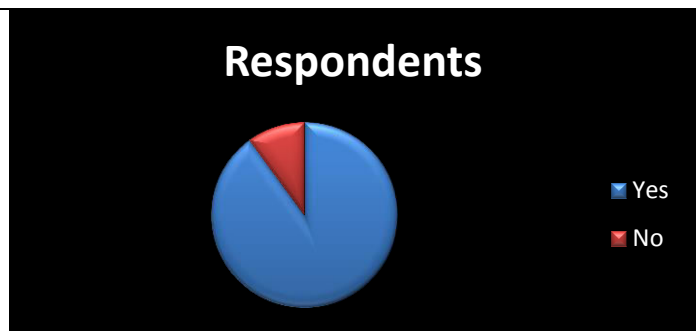


Interpretation :

Maximum respondents are agreed for the frequency of local as well as other transport is good for trekkers nearby forts,

Q.20) Do you think that the forts are the best destination for trekking?

Forts best destination for trekking	Respondents
Yes	36
No	4



Interpretation :

Almost every all respondents think that forts are the best destination for trekking

10. RECOMMENDATIONS AND SUGGESTIONS

As per the study carried out by the researcher, the main aspects which is most important i.e. preservation of forts. As a researcher I would suggest that the government should take the precautionary steps for preserving the forts for adventure tourism. There are various challenges face by the tourist, and local people near to forts. Emergency medical service should be provided; proper safety and security should be made available for the tourist and local people who are living near forts. Transportation and accommodation facility should make available for the tourists.

11. CONCLUSION

As per the feedback collected by the respondents, maximum no. of respondents who are varies from 15-25 age group are more interested to go for trekking as compared the least group is 46-55. As per the information collected by the people, male ratio is higher than the female ratio. Single people are more interested than married for trekking. Students and salaried people are more into trekking now a days. Those who are not earning money but still interested in trekking as compared to other earning people. Tourist usually goes for trekking who are having vacation and leisure time with them. Most of the people are

spending their vacation and leisure time by travelling and trekking to mountains and forts. as per the data collected by the researcher. He comes to know that maximum people are aware about trekking. Equal emphasize has been given to trekking to forts and mountains by the respondents. Most of the respondents have said that they are known about various forts in and around Pune. Respondents are known for most of the forts in and around Pune. Respondents said that weekends and holidays are good for visiting forts for trekking. Maximum people said forts are all season destination for trekking. as per the research researcher come to know that the accommodation provided for the trekker is good nearby forts. According to the respondents safety and security are provided well near forts. Maximum people convinced that they are neither agree or disagree for parking facility. People felt that availability of healthy food is one of the aspects to attract the trekkers to fort. Most of the respondents are said that guide facility is available at forts. Respondents are not satisfied for the emergency medical services provided at the forts for trekkers. People are not agreeing that shops for all emergency equipment and accessories of trekking are available for trekkers at the forts. Respondents are not satisfied the kind of mobile tower and internet facility is available for trekkers at the forts. People showed the interest saying that the frequency of local as well as other transport is good for trekkers nearby forts. Maximum respondents think that the forts are the best destination for trekking.

12. LIMITATION

- i.) The study is limited to the Pune Region.
- ii.) The study is restricted to study the use of hill forts as a trekking destination in Pune Region

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Design Of Intake System For Biogas Fuelled SI Engine

Paper ID	IJIFR/V3/ E11/ 033	Page No.	4181-4187	Subject Area	Intake System Design
KeyWords	Biogas, Design, Intake Device, SI Engine				

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Abstract

One of the major problems for the successful application of biogas as a motor fuel for SI (Spark Ignition) engines is the modifications that are required into the engine as well as intake system. To overcome this problem, a new intake device was designed. With the use of this new intake device, the engine will be effectively run on biogas. A new intake device could be serviceable by making simple modifications on the carburettor venturi and these modifications would not cause complications in the carburettor system. The paper includes design of an intake device for biogas operated single cylinder 4-S spark ignition engine.

1. INTRODUCTION

As the population and economic growth increase, most of developing countries facing the increasing demand of energy. Energy saving and emission reduction are two world wide problems. In order to meet the increasing demand on the performance of internal combustion engine and satisfy the more and more restricted emission regulations, the

power, reliability, life cycle, emissions and fuel economy of IC engine need to be further improved. In order to meet the energy requirements, there has been growing interest in alternative fuels like biodiesels, methyl alcohol, ethyl alcohol, biogas, hydrogen and producer gas to provide a suitable fuel substitute for internal combustion engines. Biogas has been a major source of energy and it is also a renewable source of energy. The biogas is easily developed under specific climatic and socio-economic conditions and the cost of production of biogas is very low. Also 60-80% methane gas is present in the biogas, hence we can use the biogas as a fuel in the SI engine.

2. NEED OF INTAKE SYSTEM DESIGN

In SI engine the air and fuel is mixed in carburetor and the homogenous mixture of air and fuel is then admitted into the combustion chamber. The fuel used for this engine is petrol which is in the form of liquid. Air comes through the air filter and fuel comes from fuel tank into the float chamber of carburetor and gets mixed with each other into throat of carburetor. This carburetor is specially designed for the stable liquid phase fuels. If it is need for fuels like biogas, it cannot be effectively used for the biogas. The major problem with the biogas as a fuel for SI engine is phase difference, the biogas exists in the form of gaseous phase. Besides, biogas is required to be stored at high pressure in the tank and when high pressure biogas comes to the intake manifold large amount of fuel is entered into the combustion chamber due to high pressure. So as to overcome these problems, the intake system is needed to be designed for biogas fuel.

IN general, to design intake system using biogas as a fuel in petrol engine, we need to make modifications in engine. Major modifications required are as follows,

- **Modification in Intake System**
 - A) Carburetor design
 - B) Intake manifold design
- **Modification in Engine**
 - A) Valve timing
 - B) Compression ratio
 - C) Spark(Ignition) timing
 - D) Turbulence in combustion chamber
 - E) Flame propagation

Before directly going to design an engine, it is logical to design intake system. In this paper the focus is limited to the intake system design.

3. DESIGN OF INTAKE SYSTEM

The basic function of carburetor is to provide required air fuel ratios at all loads and speeds. To achieve this function, throat diameter and the jet diameter must be calculated with most care. In this paper Venturi type of Biogas mixer is designed. For that the Single cylinder Hero Honda Engine is selected. A mixer is capable for providing a stoichiometric air fuel ratio for overall operating conditions of the engine to operate smoothly. A basic

venturi is designed for the 100cc engine operating at 8000 rpm. The engine specifications which we used for calculation are:

Table 3.1: Engine Specification

Name of the manufacturer	Hero Honda
Type	100cc, single cylinder, 4 stroke petrol
D & L- Bore & stroke of engine	0.05m & .049m resp.
η_v - Volumetric efficiency of engine	70%
η_{th} - Thermal efficiency of engine	30%
N- Speed of engine	0 to 8000 rpm
B.P.- Brake Power	7.5 HP(5.5kW) at 8000rpm
V_s = Swept Volume	$9.621 \times 10^{-5} \text{ m}^3$

For analysis the basic venturi design is used where the air enters at section1 and the fuel (biogas) enters at section2 i. e. at throat section and the mixture of air and fuel given to engine.

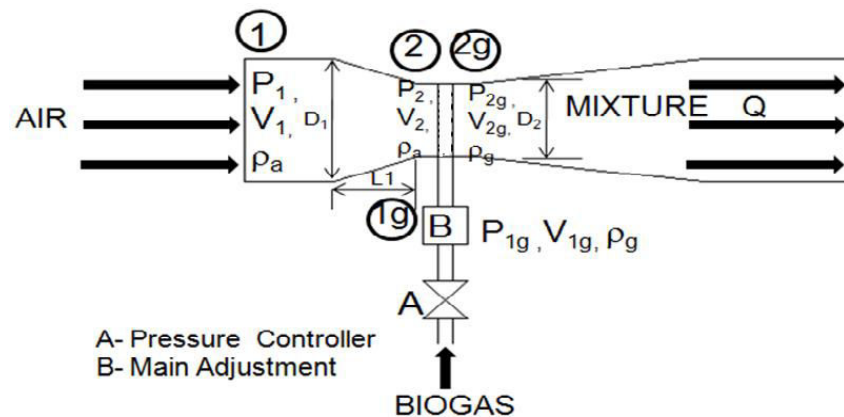


Figure 3.1: Basic Venturi

Notations and known conditions for the analytical calculations used are as follows,

- Q- Discharge of air through venturi,
- D_1 & D_2 - Diameters of venturi inlet & throat resp.,
- A_1 & A_2 - Areas of venturi inlet & throat resp.,
- P_1 - Pressure at venturi inlet = $P_{atm} = 101337.3 \text{ N/m}^2$,
- P_2 - Pressure at venturi throat = P_{2g} ,
- V_1 & V_2 - Velocities at venturi inlet & throat resp.,
- ρ_a & ρ_g - Densities of air & biogas = 1.2629 & 1.16 resp.,
- P_{1g} - Gas pressure at inlet = $P_{atm} = 101337.3 \text{ N/m}^2$,
- V_{1g} - Gas velocity at inlet = 0,
- V_{2g} - Gas velocity at throat,
- C_d - discharge co-efficient of venturi = 0.9,
- Datum at inlet Z_1 = Datum at throat Z_2 ,
- Datum of gas at inlet Z_{1g} = Datum of gas at throat Z_{2g} ,
- A_g - Area of gas passage,
- d_1 & d_2 - diameters at gas entrance in mm,

m_g & m_a - mass of gas & air resp.,
 CV_g- Calorific value of biogas= 22,700kJ/kg,
 K_V – Velocity Coefficient (assume 0.8 for small holes)

3.1 Design Calculations:

The following procedure used for designing the venturi type intake system,

Step – 1: Determine the volumetric intake air flow rate Q, in m³/s at rated or maximum operational engine speed N (rpm),

$$Q = \pi/4 \cdot D^2 \cdot L \cdot \eta_v \cdot N/60 \quad (1)$$

Step – 2: Determine the mean intake velocity V₁, in m/s

$$V_1 = Q / (\pi/4 \cdot D_1^2) \quad (2)$$

Step – 3: Determine the diameter of throat.

Its diameter D₂ is found accordingly,

$$D_2 \geq \sqrt{(4 \cdot A_1 \cdot V_1 / \pi \cdot 150)} \quad (3)$$

Step – 4: Calculate the velocity of air at throat

$$V_2 = Q / (C_d \cdot \pi/4 \cdot D_2^2) \quad (4)$$

Assuming the discharge co-efficient of venturi as 0.9 considering compressibility effect

Step – 5: Calculate pressure at throat

Assuming steady, one dimensional, incompressible, isentropic flow; the Bernoulli's theorem at section 1 and 2 is

$$P_1/\rho_a + V_1^2/2 + Z_1 = P_2/\rho_a + V_2^2/2 + Z_2$$

as Z₁ = Z₂ and P₁ = P_{atm}

$$P_2 = P_1 + \rho_a/2 \cdot (V_1^2 - V_2^2) \quad (5)$$

As V₂ > V₁, from above equation P₂ is negative then suction is occurred and this suction is helpful to suck the biogas from the gas holes.

Step – 6: Calculate the velocity of gas at throat

$$V_{2g(act)} = K_v \cdot \sqrt{[2/\rho_g \cdot (P_{1g} - P_2)]} \quad (6)$$

K_V – Velocity Coefficient (assume 0.8 for small holes)

Step – 7: Determine the mass of biogas fuel flow.

Find the total volumetric fuel demands (consumption)

$$m_a = \rho_a \cdot Q \quad (7)$$

Step 8: Calculation of mass of gas

$$A/f \text{ ratio} = m_a/m_g \quad (8)$$

Step 9: Calculation of area of inlet of gas

$$A_g = Q_g/V_{2g} \quad (9)$$

Step 10: Calculation of fuel gas inlet

For maximum condition assuming d₂ = 1.50 mm so

$$A_{2gmax} = [\pi/4 \cdot (d_1^2 - d_2^2)] \quad (10)$$

From the above design calculations we got the following required values as shown in the Table No. 3 and 4,

Table 3.1.1: Velocity of gases

Sr.No.	N (rpm)	Q ($\times 10^{-3} \text{ m}^3/\text{s}$)	V ₁ (m/s)	V ₂ (m/s)	V _{2g} (m/s)	P ₂ (N/m ²)
1	1000	1.1316	2.305	21.570	18.11	101.04
2	2000	2.2632	4.610	27.564	22.20	100.87
3	3000	3.3948	6.915	30.377	24.79	100.78
4	4000	4.5264	9.233	32.877	24.35	100.80
5	5000	5.6580	11.526	33.079	25.88	100.73
6	6000	6.7896	13.831	33.831	25.88	100.73
7	7000	7.9212	16.136	34.389	25.45	100.75
8	8000	9.0528	18.442	34.712	24.57	100.79

Table 3.1.2: Diameters of biogas inlet at throat

Sr. No	N (rpm)	A _{2g} ($\times 10^{-6} \text{ m}^2$)	m _g ($\times 10^{-4} \text{ kg/s}$)	d ₁ (mm)	d ₂ (mm)
1	1000	6.8	1.54	6.50	5.79
2	2000	8.05	2.12	6.50	5.65
3	3000	9.32	2.68	6.50	5.51
4	4000	12.8	3.64	6.50	5.09
5	5000	14.9	4.47	6.50	4.82
6	6000	17.9	5.36	6.50	4.45
7	7000	27.5	8.13	6.50	2.68
8	8000	4.81	9.37	6.50	2.16

From table no. 1 we found that the values of air and fuel inlet velocities, pressure at throat section for the speed 1000 to 8000. From table no. 2 we found the diameters at gas inlet. Here the d₁ diameter is constant but the diameter d₂ is varying in decreasing order. For adjusting the flow of biogas inlet there is accelerating device attached which is nothing but slider with a middle arrangement as shown in the following fig. As we increase the speed from 1000 to 8000 the middle diameter varies from maximum to minimum so that the proper mass of fuel came into the venturi.

4. DESIGNED CAD MODEL OF INTAKE SYSTEM

By using the above calculated values the different parts of intake device are formed and the model of venturi developed. For this the CAD software CATIA V5R16 is used. The model of designed intake system with different parts is as follows:

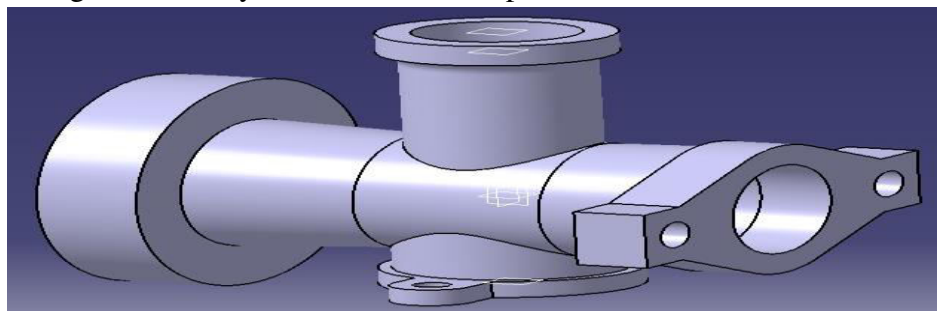


Figure 4.1: Body of venturi

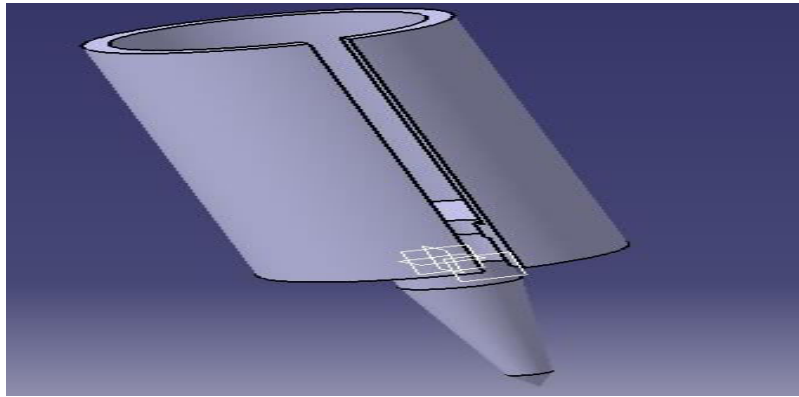


Figure 4.2: Slider with middle

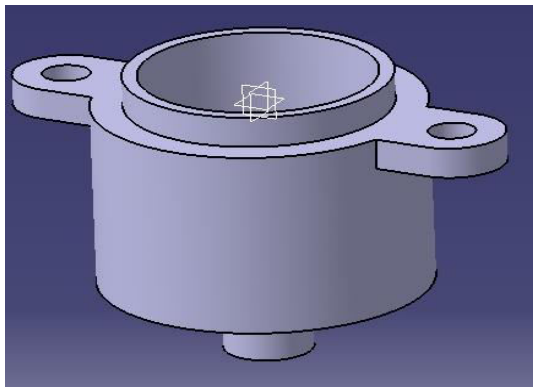


Figure 4.3: Biogas Tank

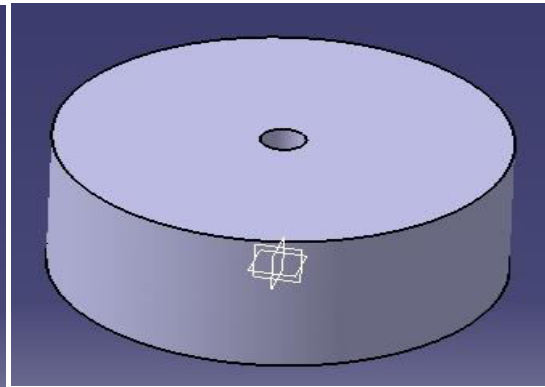


Figure 4.4: Vent

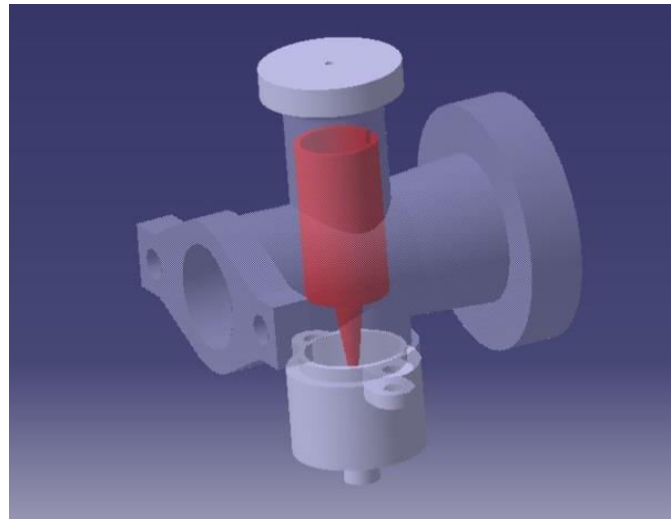


Figure 4.5: Assembly of Intake System

5. CONCLUSION

It is concluded that by using the design calculation the design of the venturi model of intake system have been done. All venturi dimentions are calculated by compairing with the standred diamentions also the dimentions of biogas inlet and accelerating device which is here slider are calculated. From all daimensions the model is designed by using CAD software i.e. CATIA V5R16.

6. ACKNOWLEDGEMENTS

I would like to express my deep gratitude to Prof. N. S. Hanamapure TKIET, Warananagar and Prof. S. M. Arali AITRC, Vita for their unending kind support and cooperation for the study. I also thank to teaching and non-teaching staff from TKIET, Warananagar who helped me directly or indirectly to complete the study.

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Analysis And Design Of Multi-Storeyed Reinforced Concrete Building Using CYPECAD

Paper ID	IJIFR/V3/ E11/ 044	Page No.	4188-4195	Subject Area	Civil Engineering
KeyWords	CYPECAD, AutoCAD, Design, Software, Reinforcement				

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Abstract

Every human has desire to own comfortable house and on an average, generally one spends his two-third of lifetime in the house. Therefore there is an increased trend towards the construction of multi-storeyed buildings for residential as well as for non-residential purposes in the urban areas. Hence nowadays the building construction has become a major work which indicates the social progress of the county. In order to compete with the ever growing competent market it is very important for a structural engineer to save time. It is emphasized that any structure to be constructed must satisfy the need efficiently for which it is intended and shall be durable for its desired life span. But in the modern scenario, it is not possible to analyze sophisticated structures manually, as even a structure of modest proportion involves many skills and literally hundreds of different operations. This calls for the use of specialized software packages for the efficient planning, analysis, design, drafting, estimation and project management. "CYPECAD" is one such software which has been used for analysis of complicated structures more efficiently and rapidly. The present project deals with the analysis and design of a multi storied residential building of G+4 consisting of 8 apartments in each floor using "CYPECAD".

1. INTRODUCTION

CYPECAD is the software for reinforced concrete, steel, timber and aluminum structures which provides the spatial analysis, structural element design, reinforcement and section edition, and construction drawings of the structure. It carries out the analysis of three dimensional structures composed of supports and floor slabs, including their foundations, and the automatic design of reinforced concrete and steel elements. With CYPECAD, the engineer holds a precise and efficient tool to resolve all the aspects related to the analysis of the structure of any type of concrete as well as being adapted to the latest international Codes. A R.C building of G+4 storey frame work is taken up for the design using CYPECAD. It is a residential Apartment of height 19.5mts, includes 50 numbers of column. The building is subjected to both vertical loads as well as horizontal loads as per IS 875. It is as two dimensional vertical frames and analyzed for the maximum and minimum bending moments and shear forces by trial and error methods as per IS456-2000. The help is taken by software and the computations of loads, moments and shear forces are obtained from this software.

2. DESIGN NECESSITY

The function of any structure is to withstand stresses due to imposed load, dead load, wind load, seismic load, temperature changes, shrinkage etc. Design of any structure includes functional design and structural design. The trial and error procedure, through which an engineer puts together an acceptable structure, constitutes "STRUCTURAL DESIGN". The various stages involved in the structural design are as follows:

- Structural Planning i.e. planning the layout of columns, beams and spanning of slabs, foundations
- Determination of action of forces and computation of loads
- Determination of member sizes and reinforcement and then analysing
- Design of the structural members
- Detailing, drawing as per designed results and preparation of schedules

3. SOFTWARE DETAILS

3.1. CYPECAD

This project involves analysis and design of multistoried [G + 4] residential building using a design software CYPECAD. We have chosen CYPECAD because of its following advantages:

- i. Program that carries out the analysis and design of reinforced concrete and steel structures, subject to horizontal and vertical loads, for homes, buildings and civil project works.
- ii. Its use guarantees maximum analysis reliability and optimum drawing design.
- iii. The geometry of the structure can be introduced automatically.
- iv. The user can personalize the design and edit the elements that have been introduced, with the on-screen support provided such as, help options and error and warning texts.
- v. Provides very complete and precise construction drawings of the structure.

- vi. CYPECAD is adapted to the latest national and international construction codes.
- vii. Seismic analysis with force amplification.
- viii. From model generation, analysis and design to visualization and result verification, CYPECAD is the professional's choice for steel, concrete, timber, aluminium and cold-formed steel design of low and high-rise buildings, culverts, petrochemical plants, tunnels, bridges, piles and much more.

3.2. AutoCAD

- i. AutoCAD is powerful software licensed by auto desk. The word auto came from auto desk Company and CAD stands for computer aided design. AutoCAD is used for drawing different layouts, details, plans, elevations, sections and different sections can be shown in auto cad.
- ii. The importance of this software makes every engineer a compulsion to learn this software's. We used AutoCAD for drawing the plan, elevation of a residential building.

4.STATEMENT OF PROJECT



Figure 1 : Plan of the building

4.1. Salient features

Utility of building	: Residential Apartment
No of stories	: G+4
Shape of the building	: Rectangle
No of staircases	: 1
No. of flats	: 40
No of lifts	: 2
Type of construction	: R.C.C framed structure
Types of walls	: Concrete block wall
Foundation Type	: Isolated and Combined Footing

Table 1: Geometric Details

Group	Group Name	Floor	Floor Name	Height	Elevation
3	Roof	7	Roof	3.00	18.30
2	Floors 2 To 6	6	Floor 4	3.00	15.30
		5	Floor 3	3.00	12.30
		4	Floor 2	3.00	9.30
		3	Floor 1	3.00	6.30
		2	Ground Floor	3.00	3.30
1	Stilt Floor	1	Stilt Floor	1.50	0.30
0	Basement 2				-1.20

I. Materials

Concrete grade: M25

All steel grades: Fe415 grade

II. Assumptions made

ON FLOOR

- Dead Load = 1.5KN/m²
- Live Load = 2KN/m²

ON ROOF

- Dead Load = 3KN/m²
- Live Load = 1.5KN/m²

Wall load for 0.2m wall = 12KN/m (25*0.2*2.55)

Depth of foundation = 1.5mtrs

Foundation Type = Isolated and Combined Footing

5. MODELING IN CYPECAD

Modeling in CYPECAD involves following steps:

- Automatic job introduction
- Specifying structure details.
- Importing of architectural drawings.
- Specifying loads on the structure.
- Defining Structure geometry.
- Defining special loads on the structure.

Using CYPECAD's Automatic job introduction, the user has two options which allow for a structure to be generated automatically either by means of importing a file in IFC format, generated by the main CAD/BIM programs (Archicad, Revit Architecture); or by using a file in DXF or DWG format. For the current project we imported plan of the building in DWG format. Specifying Structure details involves entering of details such as numbers of floors, height of the floors etc. The architectural drawings that are to be imported should be edited such that it fulfills the software requirements. Editing of drawing involves creating layers which indicates the positioning of columns and its

dimensions. These different floor drawings which are edited are imported to the software for further modeling.

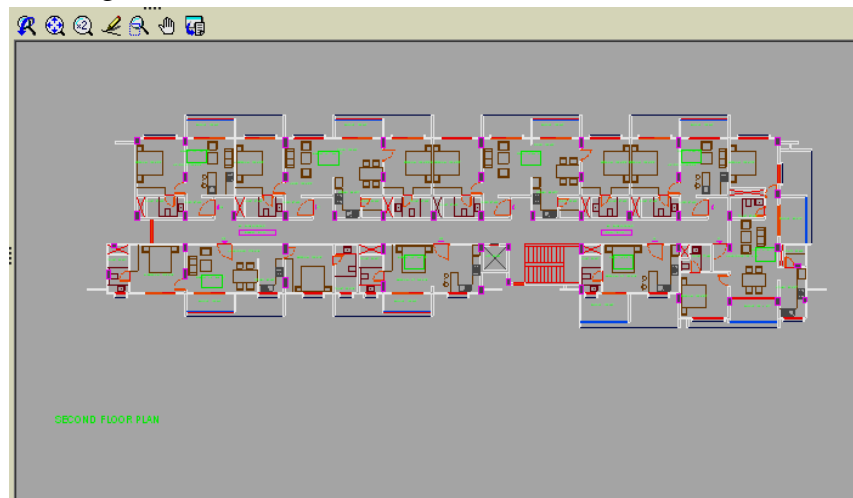


Figure 2 : Structure geometry

After importing the architectural drawings the floor loads which are calculated earlier are feed to the software. The dead loads and live loads are entered separately. The software allows usage of different load cases. After giving all the data the layout of Column, Beam & Slab is done and we get the 3D view of the structure i.e. The Modeled Structure.

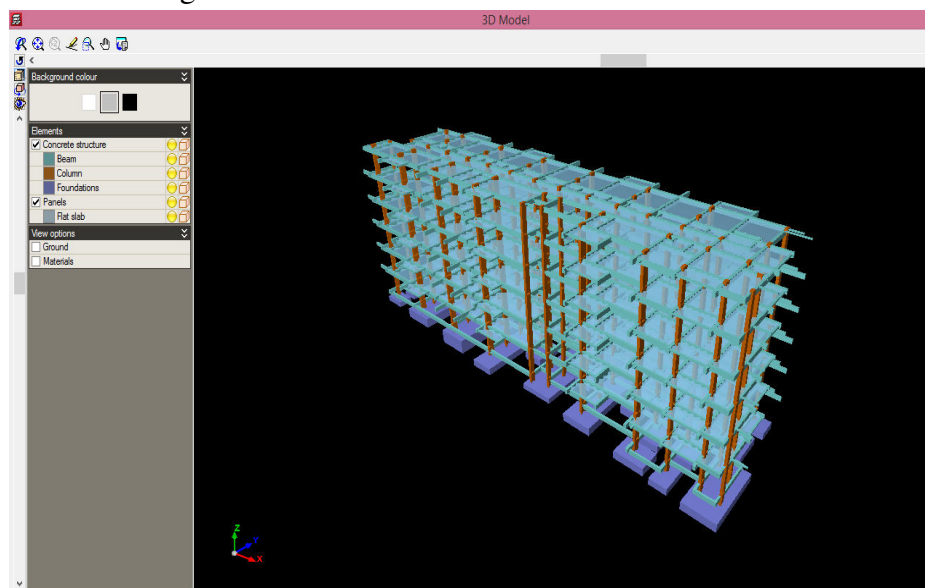


Figure 3: Modeled structure

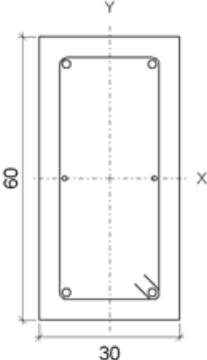
After Modeling we perform the analysis part without foundation and the analysis is done by a method known as Stiffness matrix method. Once the structure is modeled we select the appropriate foundation for the structure based on trial and error method, for our project we found that isolated footing is safe with bearing capacity of soil assumed as 200KN/m^2 . A vast amount of analysis and reinforcement options are available to be able to take into account those aspects that are deemed most adequate. Additionally, for each structural element and each reinforcement position, personalized reinforcement tables may be defined. For all design elements, their geometry and reinforcement can be edited and

modified, with multiple tools to carry out the task. Drawings can be personalized according to the user's needs, as the program allows configuring all the drawing layers and elements and generating them via DXF, DWG, printer and plotter.

6. RESULT AND ANALYSIS

6.1. Design Reports

Table 2: The code check for roof column no.8

Column data	
	Geometry
	Dimensions : 30x60 cm
	Span : 15.300/18.300 m
	Free height : 2.55 m
	Geometric cover : 4.0 cm
	Maximum aggregate size : 20 mm
	Materials
	Concrete : M 25
	Buckling length
	ZX plane : 2.55 m
	Steel : Fe 415
	ZY plane : 2.55 m
	Longitudinal reinforcement.
	Stirrups
	Corner : 4Ø20
	Perimeter : 1sØ8
	Y Face : 2Ø12
	Spacing : 15 cm
	Steel area : 0.82 %

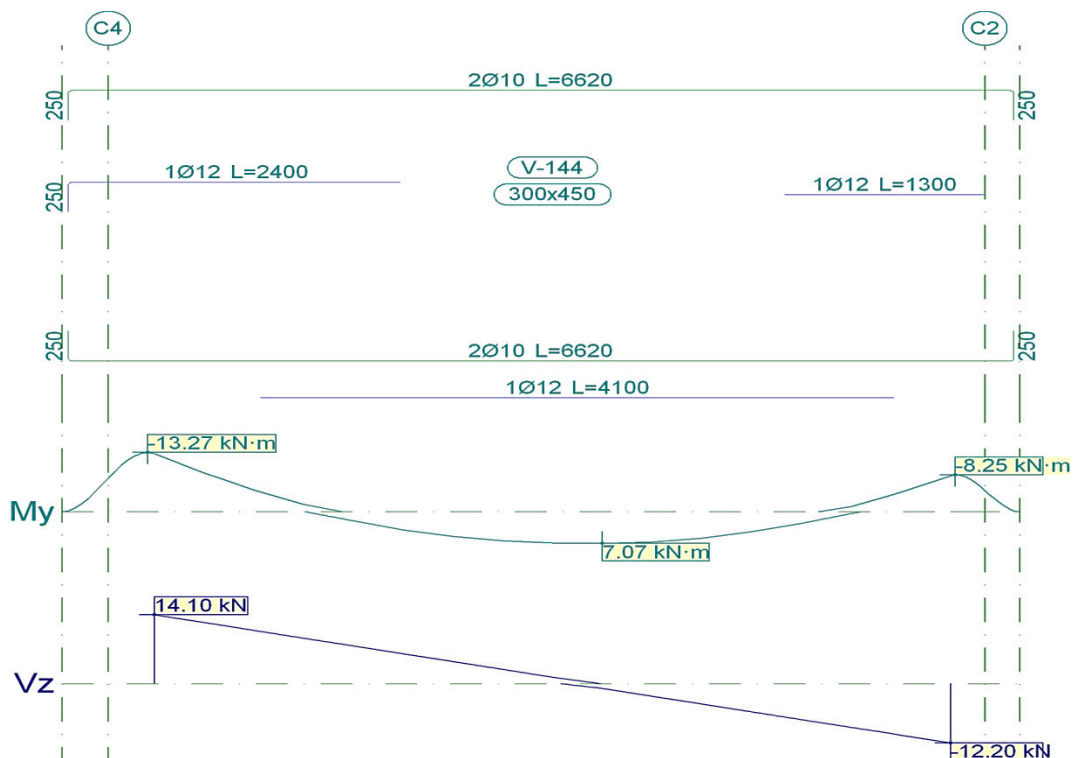


Figure 4: Beam reinforcement report of frame 14

Table 4: Slab 55 and 51 reinforcement report

Slab	Dir	Depth	Moments			Steel areas			Additional reinf.		
			Left	Centre	Right	Left	Centre	Right	Top Left	Bot. Centre	Top Right
L55	X	0.15	4.98	0.99	3.00	2.01	0.40	1.21	Ø8@22.5	Ø8@25	Ø8@25
	Y		2.54	1.05	4.89	1.03	0.42	1.98	Ø8@25	Ø8@25	Ø8@25
L51	X	0.15	-----	1.14	-----	-----	0.46	-----	-----	Ø8@25	-----
	Y		9.93	2.56	5.73	4.01	1.03	2.32	Ø8@12.5	Ø8@25	Ø8@20

Table 5: Foundation reinforcement report of Column 3 and 4

References	Geometry	Reinforcement
C3	Centered rectangular footing Footing width X: 215.0 cm Footing width Y: 150.0 cm Depth: 50.0 cm	X: 10Ø12@15 Y: 16Ø10@13
C4	Centered rectangular footing Footing width X: 265.0 cm Footing width Y: 180.0 cm Depth: 60.0 cm	X: 16Ø12@11 Y: 17Ø12@15

7. CONCLUSION AND SCOPE FOR FURTHER STDIUES

Conclusion

- Analysis and Design conducted using CYPECAD satisfies the permissible deflection limit.
- Analysis and design by using CYPECAD consumes less time hence this can be highly useful for quicker work & time bound projects.
- Reinforcement Detailing, Drawing are generated along with the result automatically by CYPECAD whereas in other relevant software the drawing have to be generated separately.
- Quantity of steel (Length & total weight) is generated by the software which reduces labour time.
- Reinforcement area graph helps in achieving economy in material used.
- CYPECAD enables to check the safety of design and modification in individual structural element.

Scope

- Analysis and design can be done using different available software to compare the accuracy of the results obtained.
- Analysis and Design was done for Cast in situ, it can be done for precast member which is economical and consumes less time for structure to put in service.

- iii. Tall building with several floors can be analysed and designed in a short time.
- iv. Provision for circular beam and slab are available in CYPE hence as per aesthetic it can be adopted.
- v. As per site condition if the sloping area is present then the retaining wall can be analysed and designed easily.
- vi. Depending upon the soil bearing capacity of soil different types of footings can be tried.

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Examining the Relationship between Work Life Balance, Job Stress and Job Satisfaction Among School Teachers : A Case of School of Pondicherry

Paper ID	IJIFR/V3/ E11/ 046	Page No.	4196-4207	Subject Area	Management- HR
KeyWords	Job Stress, Job Satisfaction , Work Life Balance, School of Pondicherry, Hafiz Hayat Campus				

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Abstract

The main purpose behind conducting the study is to investigate the relationship between work life balance, job stress and job satisfaction among School teaches. The study has been undertaken among teachers of School with reference to city of Pondicherry. A sample comprises of 171 teachers has been chosen from Govt School of Pondicherry. Random Sampling method has been used as sampling technique for the study. Questionnaire is the tool used for collecting data for the research. Data has been analyzed through Statistical Package for Social Sciences (SPSS). Descriptive Statistics, Correlation and Regression analysis has been applied to draw the results of the study. The findings of the study indicate that there is insignificant relationship between job stress and job satisfaction which prove H10 hypothesis whereas work life balance share a moderate positive relationship with job satisfaction which are in accordance to hypothesis H2A. Results of the study is helpful for educational institutions as well as teachers to get batter understating about relationship exist between job stress, work life balance and job satisfaction thus contributing toward their performance improvement.

1. INTRODUCTION

Work and Family are two important aspects of an individual's life. Changes in the workplace and employees demographic have driven the attention of many researchers toward the boundary between work and family life of employees. The main purpose behind conducting the study is to investigate the relationship of work life balance and job stress with job satisfaction among school teachers. Work life balance is an important topic of discussion in the business world. Managing work with family is an important issue as it has decisive challenges for organizations, employees and researchers. There occur a dramatic shift in the obligation of work and family life due to change in the political, social and economic values. Individuals have to deal with and acclimatize to the conflict of inter roles which has resulted from shifts in the area of work and family. (Frone & Rice, 1987). "A state where an individual manages real or potential conflict between different demands on his or her time and energy in a way that satisfies his or her needs for wellbeing and self-fulfilment is referred as work life balance" (Clutterbuck, 2003).

Satisfaction and stress both are considered to be originated from work and family lives of individuals. Globalization has altered the working environment that has led to restructuring of jobs, greater the workload demand, part time and insecurity of job. It is perceived strongly that work is an ultimate source of stress and distress among individuals. Job stress influence employee's physical as well as mental condition, it also has considerable influence on satisfaction level of employees their performance and level of absenteeism. (Tennant, 2001) Stress is the imbalance between demands perceived and resources a person have (Byrnes, 2003).

Job satisfaction is of vital importance for efficiency of an organization as well as its effectiveness. "Job satisfaction is referred to as a situation made up of any psychological, environmental and physiological combination that makes an individual trustfully says he is satisfied of his job". (Hoppock, 1935). Academic profession incorporates demands that are potentially challenging along with wide range of responsibilities. Individuals belongs to the profession experience much more problems than any other profession in maintaining their work life with personal life effectively. Job of academics produce strain as a result makes it difficult for them to meet their social, family and work obligations efficiently. Strain experienced by Academics in performing family and work role results in outcome like reducing productivity of workers, increasing absenteeism and high turnover rate among employees. The most important influence to be notice is increase in the level of dissatisfaction in academics and they complain their institutions do not corporate with them in achieving a fair balance between work and personal lives. (Fisher, 1994).

Quality of teaching at School level cannot be attained without highly satisfied teachers (Qayyum, 2013). In past few years there is tremendous increase in the number of universities in Pakistan which have increase the level of problems and pressure for academics. Organization are experiencing alternation in their working environment resulted from shifts in economic, demographic as well as social factors and academics are

not out of its influence. These changes have confronted academics to job stress which will ultimately affect their satisfaction and work life balance.

The main purpose behind conducting the study is to investigate the relationship of work life balance and job stress with job satisfaction among School teachers with reference to School of Pondicherry Hafiz Hayat Campus to get an insight into these issues.

1.1 Problem Statement

The relationship between work and family life termed as work life balance has become an important topic of discussion for current government, practitioners and academics. (Warhurst, Eikhof, & Haunschild, 2008). Issue of managing workplace needs with personal life needs is gaining importance among workers all over the world and academics of higher education institutions are not out of it. (Stanton, Noor, & Young, 2009). Teaching is a very dignified profession. The success of any nation ultimately depends upon its students and how they are getting education. It is not possible that a professors under stress, with a sense of dissatisfied with the job and having lack of balance in their work and family lives will produce good students. Lack of concern towards teacher's issues and problems is perhaps due to fewer awareness and understanding about them. The study is therefore conducting with a view to throw light on the relationship among work life balance, job stress and job satisfaction among School teacher. The knowledge about these issues will lead to creation of awareness and thus development of solution for the problems faced by School teachers.

1.2 Objectives

Fulfilment of following objectives is the main purpose behind conducting the research:

Main Objective

To find out the relationship of work life balance and job stress with job satisfaction among School teachers in Pakistan.

Sub Objectives

- ▶▶ To find out the level of work life balance, job stress and job satisfaction.
- ▶▶ To find out the relationship between job stress and job satisfaction.
- ▶▶ To find out the relationship between work life balance and job satisfaction.

2. LITERATURE REVIEW

A. Job Satisfaction

Job Satisfaction from long period of time has been an area of interest for many researchers because of its vital role in organizations effectiveness (Maslow, 1954). Job satisfaction is a concept which is versatile and complex different people perceives it differently. It's often considered in context of motivation but it's quite apart from it. It's more like a person's perspicacity, internal feeling and emotion that could be linked to things like a person feeling of achieving something (Mullins, 2005). There are two type of attitude toward the job one is positive other is negative. (Abdul, Ismail, & Jaafar, 2010). It is an established fact around the globe that a person have positive attitude toward job if he has high level of job satisfaction whereas a personal have negative attitude toward job if he is

dissatisfaction from the job. People use the term employees' attitude mostly as an interchangeable word to satisfaction of employees from their job (P.Robbins & Coulter, 2004).

B. Work Life Balance

Work-life balance is the degree to which an individual is involved in and satisfied equally with their job and personal roles (Saikia, 2011). Work life balance for individuals belongs to educational institutions are of great importance as it create knowledge for all sectors of society. Lack of balance in family and work life among academics will be harmful for all other sectors. (Greenhaus, Collins, & Shaw, 2003) According to (Veenhoven, 1991) effective balance in job and personal life makes a person more content and happier. It has been revealed in various studies that a higher desire to achieve more lead people to make extreme efforts that increase their working timing and they lost their work life balance. It ultimately reduces level of satisfaction among professional and increased the level of stress experienced by them. (Beehr & Newman, 1978). It is evident that integrating and maintain work life balance into our lives is the current need of the hour. (Mukhtar, 2012).

C. Job Stress

Stress arises when individual doubt his capability to deal with threats to their wellbeing as well as his ability to fulfill demands accurately which are being made on him (Lazarus, 1966). Conflict between employee's demands of job and degree of control employee can exert to accomplish these demands results in a harmful mental and physical response which is defined as "Workplace Stress". (Arandelović & Ilić, 2006)

Stress in the workplace is costly and keep on increasing. Causes of stress in the workplace are many that involve a complex combination of social, physical and psychological elements. Stress is difficult to measure as it influence individuals differently. Stress has a strong relationship with unhappiness as well as ill health among people. (Blaug, Kenyon, & Lekhi, 2007). Stress is not just a part of the job, a thing to be ignored or a price paid up for career success it is found to be a cause of various stress related illness either directly or indirectly. Unhealthy work environment effect employee's health both physically and mentally Many organizations seen stress as an indication of weakness and in order to avoid negative brunt kept it hidden. Stress is mostly ignored by people who are at the position to manage it. (Melanie Bickford, 2005). Sources of stress among teacher are work load, relationship with colleagues, role conflict, role ambiguity, discipline problem, time pressure, bad working condition, self-respect, inadequate support from friend, family and colleagues of low motivation among students, (Detert, Caravella, Derosia, & Duquette, 2006).

D. Relationship between Work Life balance, Job Stress and Job Satisfaction

- Nadeem & Abbas (2009) conducted a study in Pakistan to analyze the relationship between work life and job satisfaction. Data is collected from 157 employees of public and private sector through questionnaire. Data is analyzed through Correlation, Regression and Descriptive analysis. The research results indicate that job stress is negatively correlated to stress at job, family to work interfaces and job conflict. Work

overload does not influence job satisfaction. Positive relationship exists between Job autonomy and job satisfaction.

- ▶▶ Mcnall, Masuda, & Nicklin (2010) conducted the study to analyze the relationship between flexible work arrangement and job satisfaction. Data is collected from 220 employees. Data is analyzed through regression analysis. Results of the study indicate that greater the flexible work arrangements provided more will be the satisfaction employee will have from their jobs.
- ▶▶ Saif, Malik, & Awan (2011) conducted research in Pakistan to analyze relationship work life balance practices have with job satisfaction. Data is collected from 450 layoff supervisors from two large organizations in Pakistan through questionnaire. The results reveal that work life balance practices and level of job satisfaction share a Positive relationship.
- ▶▶ Rani, Kamalanabhan, & Selvarani (2011) conducted the study to evaluate the relationship between work life balance and employees satisfaction. Data is collected from 210 respondents in IT organizations through questionnaire. Multiply regression analysis was applied to drive the results. Results indicated job satisfaction have positive relationship with work life balance and negative relationship with work recognition, relationship with subordinate & supervisor and task at work.
- ▶▶ V.Varatharaj & Vasantha (2012) conducted the study to examine relationship job satisfaction have with work life balance in women. Data is collected from 250 Service Sectors working women in Chennai city through questionnaire. Data is analyzed through, Correlation, Chi-Square test, Wallis Test and Kruskals. Result shows strong positive relationship exists between job satisfaction and work life balance.
- ▶▶ Fatima & Rehman (2012) conducted research to examine role ambiguity and role conflict effect on employee's job satisfaction as well as leaving intention. Data is gathered from 120 teachers from Rawalpindi and Islamabad universities in Pakistan. SPSS and Regression Analysis are used to analyze the data. The results indicate that job role conflict and role ambiguity are negatively related to job satisfaction and positively related to job leaving intentions.
- ▶▶ Quarat-ul-ain, khattak, & Iqbal (2013) conducted the study to examine the relationship of job satisfaction with role conflict and impact of job stress on the relationship in private banking sectors employee in Pakistan. Data is collected from 350 employees through questionnaire. Data is analyzed using SPSS, Correlation and ANOVA test. Study results shows that role conflict share a positive relationship with job stress and negative relationship with job satisfaction.
- ▶▶ R.Gayathiri & Ramakrishnan (2013) conducted study to investigate the concept of quality of work life and to analyze nature of relationship it have with job satisfaction. The result indicates that the concept of work life quality is multidimensional and it influence employee's use of skills, knowledge, relationship with other and professional interaction and collaboration. Positive relationship exists between job satisfaction and quality of work.

- ▶▶ Yadav & Dabhade (2013) conducted research to analyze the relationship that exists between work life balance and job satisfaction of the working women. Sample is collected from education sector and banking sector. Data is collected from 150 women employees 75 women from each sector. Authenticity of data is analyzed through application of standard deviation. The results indicate that work life balance and job satisfaction share significant relationship.
- ▶▶ Chaudhry (2012) conducted research to analyze relationship of job satisfaction and job stress among School teachers. Gender, nature of job, experience, nature of job and sector was used as base for the study. Data is collected from six Pakistani universities three public and three private. Data is analyzed using descriptive statistics, inferential statistics, cross tabulation and frequency distributions. The results show that job stress has insignificant relationship with job satisfaction.
- ▶▶ Nazari & Emami (2012) conducted the research to analyze the relationship between occupational stress and job satisfaction among Academics in Iran. Data was collected from 500 respondents of universities. Data is analyzed using SPSS, Correlation and Multiple Regression analysis. The results indicate that not relationship exists between job satisfaction and occupational stress.
- ▶▶ Usman, Akbar, & Ramzan (2013) conducted research to evaluate the effect of salary and job stress on job satisfaction of faculty. Data is collected from 100 respondents and analyzed through descriptive statistics, correlation and Regression analysis. Results reveal that no relationship exists between job satisfaction and occupational stress.

3. THE STUDY DESIGN

3.1. Hypothesis

H10 = There is no relationship between job stress and job satisfaction.

H1A = There is a relationship between Job Stress and job satisfaction.

H20 = There is no relationship between work life balance and job satisfaction.

H2A = There is a relationship between work life balance and job satisfaction.

Independent Variable - Job Stress

Dependent Variable - Job Satisfaction

Independent Variable - Work Life Balance

Causal explanation testing is the essence (Sarantakos, 2004); and (Marczyk, DeMatteo, & Festinger, 2005). Considering methodology approach this study has used survey research.

3.2 Population

Entire group of persons that conform to certain specification that are of interest to the researchers and on which results of the study can be generalized is termed as population (Polit & Hungler, 1999). All faculty members working in School of Pondicherry Hafiz Hayat Campus are Population of the study.

3.3 Sample Size

Sample is termed as portion of research population selected to make a part of the study and are envoy of the entire research population (LoBiondo-Wood & Haber, 1998). Sample of the study is constitute of 171 School teachers. Sample size is determined using (Yamane, 1973) formula:

n = Sample Size.

N = Total Population.

e = Margin of Error.

1 = Constant Number.

$n = 171.429$

$n = 171$

3.4 Sampling Design

The researcher has selected probability sampling design for the study in which simple random sampling is used. Researchers preferred simple random sample over the others because it provides the assurance that sample will accurately reflect the population on the basis of criteria used for simple random sampling (Cooper & Emory, 1995) (Johnson & Christensen, 2010).

3.5 Measures

Questionnaire has been used as data collection tool for the study. Questionnaire is a good quantitative research tool for analyzing attitudes and behavior of humans. (Francis, et al., 2004). The questionnaire is composed of four parts. The first section deals with job stress measured with an 8 item scaled Questionnaire proposed by (Ning, 2004, Verret, 2012). Each item is measured on five point Likert Scale. Ranges from strongly agree at 1 to strongly disagree at 5. The second section deals with job satisfaction measured with a 14 item scaled questionnaire proposed by (Mukhtar, 2012). Each item in the scale is measured by five point Likert Scale. Ranges from strongly agree at 1 to strongly disagree at 5. The third section deals with work life balance measured with a 14 item scaled questionnaire proposed by (Hayman, 2005). Each item is measured by seven point scale ranges from not at all at 1 to all the time at 7. The fourth part of questionnaire constitute demographic information age, gender, marital status and experience are included in this section.

3.6 Procedures

Data has been analyzed through Statistical Package for Social Sciences (SPSS). Descriptive Statistics, Correlation and Regression analysis has been applied to draw the results of the study

4. RESULTS

The respondents in the study 43% were Male and 57% were Female. The majority of the respondents in the study were married (53%) and 47% of the respondents reported themselves as unmarried. All the respondents in the study ranged in age from 21 years to 50 years. 68% of the respondents were between the ranges of 21 to 30 years, 25% of the

respondents were between the range of 31 to 40 years and 7% of the respondents were between the ranges of 41 to 50 years. 25% of the respondents in the study have less than 1 year of experience in the School, 32 % of the respondents have experience between the ranges of 1 to 3 years, and 43% of the respondents have experience of more than 3 years.

Table I: Descriptive Statistics

Characteristics	Percent (%)
Gender	
Male	43.4
Female	56.6
Marital Status	
Married	52.6
Unmarried	47.4
Age	
21-30	68.4
31-40	25.0
41-50	6.6
Experience	
Less than 1 year	25.0
1 to 3 years	31.6
more than 3 years	43.4

Table II: Correlations

1. Job Stress		(.627)	
2. Job Satisfaction	Pearson Correlation	.052	(.850)
	Sig. (2-tailed)	.658	
3. Work Life Balance	Pearson Correlation	.326**	(.638)
	Sig. (2-tailed)	.004	
Values of Cronbach Alpha are given in Parenthesis.			
** Correlation is significant at the 0.01 level (2-tailed).			

Results in Table II indicate that Cronbach Alpha for Job Stress, Work Life Balance and Job Satisfaction were .627, .638 & .850 respectively.

Based on the given statistics H10 is not rejected. The results show that there is insignificant relationship between job stress and job satisfaction.

Based on the given statistics hypothesis H2A is supported. The results show that a significant and positive correlation exists between work life balance and job satisfaction. The correlation is moderate in strength.

Results in Table III indicate that Job Stress and Work Life Balance together explain 10.7% of the variation in the Job Satisfaction ($R^2 = .107$). ($F=4.358$, $p= 0.016$). An inspection of individual predictors reveal that Work Life Balance ($B=.216$, $p=.005$) is positively correlated with Job Satisfaction suggest that high level of Work Life Balance is

associated with high level of Job Satisfaction. Occupational Stress ($p = .974$) is not a predictor of Job Satisfaction.

Table III: Regression Analysis

Independent Variable	Dependent Variable	R Square	F	Sig	B	T value	Sig	Hypothesis
Job Stress	Job Satisfaction	.107	4.358	.016	.013	.067	.947	H10 Is Accepted
Work Life Balance					.216	2.915	.005	H2A Is Accepted

6. CONCLUSION

The research contributes in existing body of knowledge by investigating the relationship of Work Life Balance and Job Stress with Job Satisfaction among School Teachers. The findings of the study confirm both hypotheses. Relationship between Job Stress and Job Satisfaction are found insignificant among School Teachers which are in accordance to the findings of (Nazari & Emami, 2012, Usman, Akbar, & Ramzan, 2013, Qayyum, 2013). Relationship between work life balance and job satisfaction is found significant and of moderate positive nature which mean increase in Work Life Balance will result in increase in Job Satisfaction which are in accordance to the findings of (Nadeem & Abbas, 2009, Saif, Malik, & Awan, 2011, V.Varatharaj & Vasantha, 2012). Thus none of the two hypotheses is rejected.

7. SIGNIFICANCE OF THE STUDY

The study is of significance for the academics, researchers and organizations. The study contributes to existing body of knowledge by providing an insight into relationship exist between work life balances, job stress and job satisfaction among School teachers. Globalization has brought tremendous changes in working conditions thus give rise to various issues and problems for employees. The study will help to get awareness about the issues and problems faced by employees at work place that will be of beneficial for organizations and institutions to formulate strategies that will booster satisfaction level, minimize job stress and maintain a healthy work life balance among employees thus ultimately enhance organizations effectiveness and efficiency. The study is also of importance for researchers as it provides a first step initiative for further studies.

8. LIMITATIONS

The present study suffered from some limitations that must be known before taking into consideration the results of the research. The main limitation of the study is as participant of the study is from a particular School the area of investigation is limited. Due to this factor results of the study cannot be generalized to large population.

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Comparative Study Of Selective Fibrous Material For Treating Rice Mill Effluent

Paper ID	IJIFR/V3/ E11/ 047	Page No.	4208-4214	Subject Area	Civil Engineering
Key Words	Adsorbents, Rice Mill Effluent, Waste Water Treatment, Fibrous Coffee Husk Blended With Wooden Chips, Coconut Coir, Palm Coir, Areca Nut Coir				

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Abstract

There are many rice mill industries in and around South Canara District as the main crop of this area is paddy. The area like Udupi and Mangalore are very much attached with the boiled rice. Hence parboiling plants are attached with these rice mills. Water is the most important factor involved in the preprocessing of rice. The waste water generated due to this activity requires treatment before it is discharged to the environment, as the water will be rich in high organic content. In this study an attempt is made to reduce the organic content of the waste water by using different low cost adsorbents. Grab sampling was done for the collection of samples. Work was done in Environmental Engineering Laboratory. Different adsorbents such as fibrous coffee husk blended with wooden chips, coconut coir, palm coir, areca nut coir were used as fixed bed. The samples were analyzed for parameters such as pH, TDS, Total hardness, Turbidity, Fluoride, Sulphate, BOD, COD, Iron, and Nitrate.

1. INTRODUCTION

In India, rice has long been the staple food for more than 65% of the population. It is the largest consumed calorie source among the food grains catering to the needs of about 70

percent of the world population and about 90 percent of Asian population. Environmental problems ranging from noxious aerosols, fumes in the air, heavy metals and hazardous organics into the water to solid wastes that will overcome our land fill. The scarcity of water resources, the ever deteriorating in many metropolis, the threat of monitoring volumes of wastes to without, suitable disposal sites and a long list of other critical innovative must be resolved through innovations of scientist and engineers. Hence, we focus our attention in developing a method for reuse of waste water for various purposes. In this work it is planned to collect the waste effluent from the rice mills in and around and analyze the various basic characteristics of waste effluent. The ground water is depleting in a fast manner. The water available should be used with greatest care to cater the needs of the people.

Waste water characteristics are:

- Low pH
- Organic matter
- Nitrogen(amino)compounds
- Sulphates
- Dissolved solids

2. OBJECTIVES

The scope of the project is to study the existing water filtration methods and to design a low cost water filtration adsorption technique. This water filtration system made with glass, which will focus on cutting down the cost while maintaining filter effectiveness, by providing affordable water filters for the rural and remote areas, will greatly improve people's quality of living, and reduce the risk of any waterborne diseases therefore saving lives. The following are the objectives taken in to consideration:

- Removal of contaminants, mainly total solids, BOD, COD, pH, Sulphate, Hardness, Iron, Nitrate, Fluoride.
- Analysis of adsorption effectiveness in removal of effluents for the different filter medias.
- Cost estimation of all the media used and also the glass filter.
- To reduce the concentration of the effluent by using different adsorbents.
- Comparison of adsorbents with respect to their characteristics.

3. ADSORPTION

3.1.General

Adsorption is a surface phenomenon which may be defined in terms of a unit operation in the chemical engineering sense and the operation which deals primarily with utilization of surface forces and concentration of materials on the surface of solid bodies referred to as adsorption. twist.

3.2. Types of adsorbents

- Coconut coir: Coir is a hard and tough organic fibre extracted from the husk of coconut. Coir fibre contains more lignin that is 45.84% than all other natural fibres. The degradation rate is slow as compared to other fibres because of more lignin content.
- Coffee husk: Coffee husk is a mucilaginous material. It is an ideal substrate for microbial process[1].
- Areca nut coir: The areca nut is the seed of areca palm, which grows in much of tropical pacific, Asia and parts of east Africa. Inexpensive and abundantly available.
- Palm coir: Coir is hard and tough organic fibre. Its Degradation is slow. Due to its toughness nature it's difficult to taken out coir from palm fruit. It is nearly come close to the property of coconut coir. It is abundantly available material.

3.3.Requirements of Adsorbents

- High porosity, high internal surface
- High adsorption efficiency
- Good balance between macro pores and micro pores
- Mechanically integrity during handling
- Low pressure drop over the adsorbent bed.

4. SAMPLING

The effluent was collected from Dhanyalaxmi Rice Mill located in Nittur, Udupi (figure.1). There are two main types of samples which are used in water and wastewater treatment, grab samples and composite samples.

4.1.Grab sampling

A grab sample, also known as a catch sample, consists of a single sample taken at a specific time. This is the most common type of sampling technique used.



Figure 1.Dhanyalaxmi Rice Mill Effluent Collection Tank in Nittur, Udupi

4.2.Composite sampling

A composite sample consists of a mixture of several individual grab samples collected time periods, each sample taken in proportion to the amount of flow at that time. Composite samples give a more representative sample of the characteristics of water at the plant over a longer period of time.

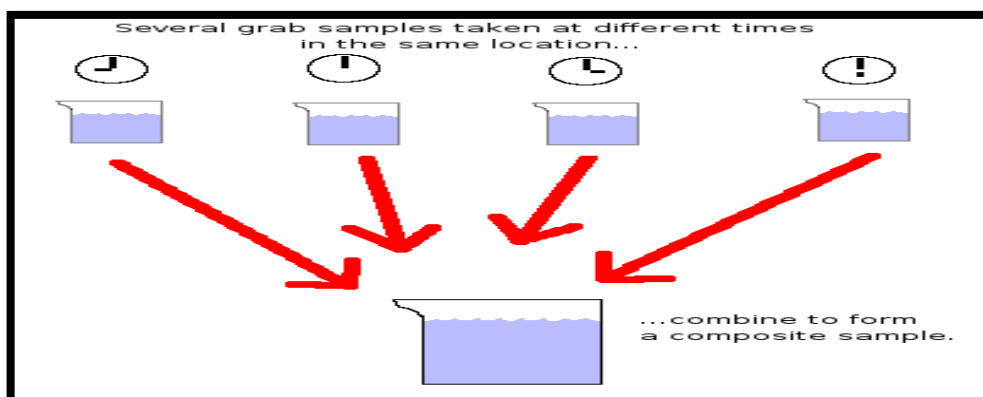


Figure 2.Composite Sampling

5. METHODOLOGY FOR PREPARATION OF ADSORBENTS

A. Coconut coir

Coir is taken out from the coconut outer shell, it is to be cleaned with water to remove fiber materials. Then water content in the coconut coir is removed by placing it to sunlight. About 127 grams of dried coir is placed in the container as a fixed bed at height of 75 mm.

B. Coffee husk blended with wooden chip:

Coffee husk blended with wooden chip were prepared by taking of 600 grams of coffee husk and nearly 400 grams of wooden chips. Before starting the procedure to blend, wooden chips were pretreated to reduce the color contribution to the treated effluent. Coffee husk and wooden chips were soaked in a separate container filled with potable water for a contact time of three days until all the color which is brownish is removed from it. These materials were blended together in the ratio of 60:40.

5.1.Arecanut coir:

Coir is taken out from the areca nut outer shell; it is to be cleaned with water to remove fiber materials. Then water content in the areca nut coir is removed by placing it under sunlight. About 250 grams of dried coir was used as a filter bed. The height of coir maintained in the tank was 75mm.

5.2.Palm coir:

Coir is taken out from the palm outer shell; it is to be cleaned with water to remove fiber materials. Then water content in the palm coir is removed by placing it to sunlight. About 350 grams of dried coir was used as a filter bed. The height of coir maintained in the tank was 75mm.

5.3.Adsorption procedure

In the proposed design model, initial characteristics of the sample were determined by conducting various tests. The effluent is then passed through different adsorption media which is placed separately from the open end of the container. It is continuously aerated to maintain aerobic condition. After adsorption, the treated effluent is collected from the container bottom fitted with a tap. The treated effluent for different effluents is then tested for various tests



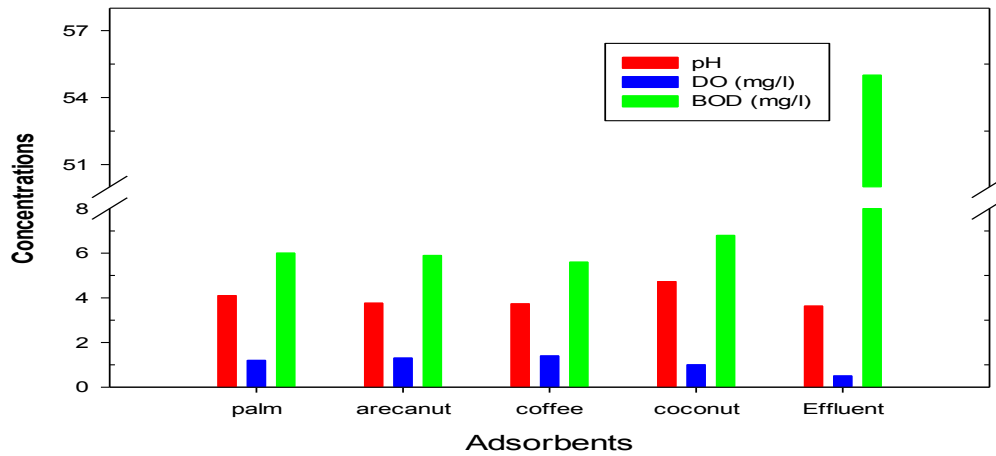
Figure 3: Coconut coir as adsorbent

6. RESULTS AND DISCUSSIONS

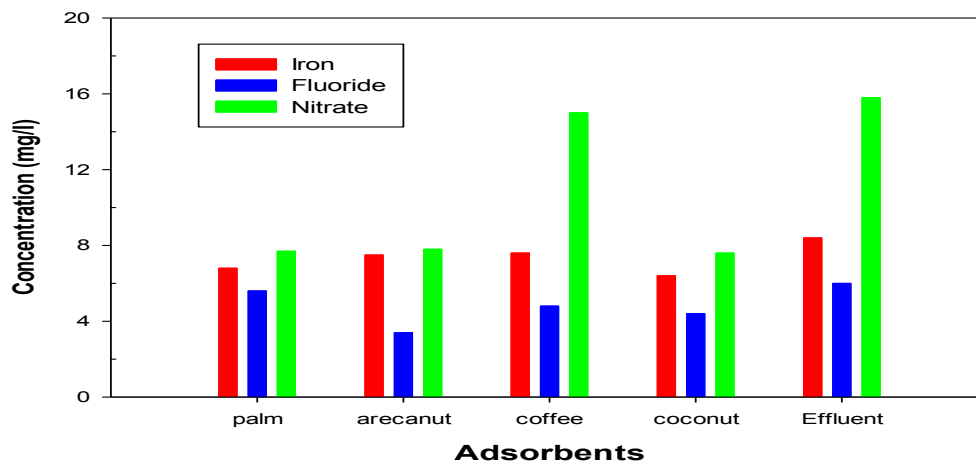
The samples collected were analyzed for different parameters such as pH, Turbidity, Total solids, Sulphate, Hardness, COD, DO, BOD, Iron, Fluoride Nitrate. The results obtained for different adsorbents are compared and shown in the below table.

Table 1: Parameter values with different adsorbent

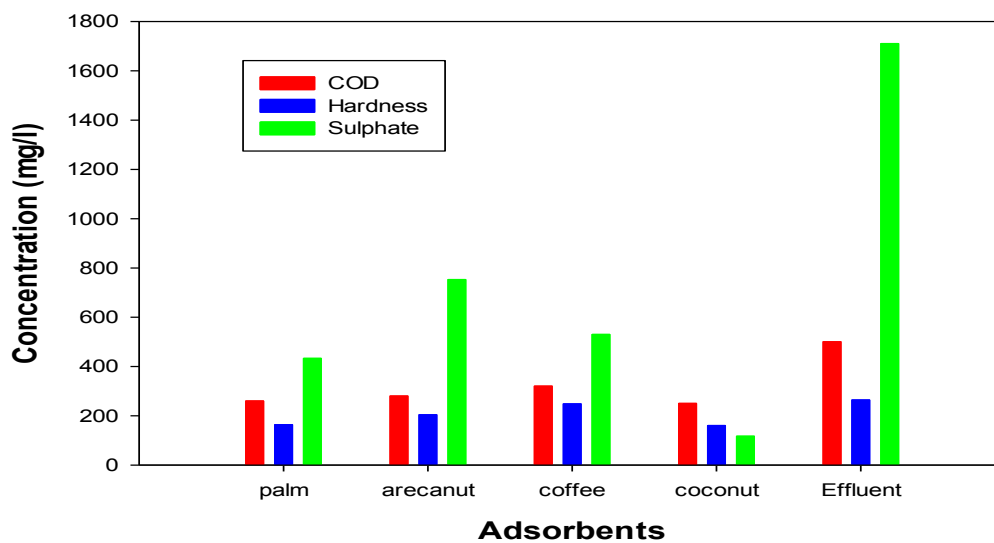
Sl.no	Parameters	Palm coir	Areca nut coir	Coffee husk	Coconut coir	Effluent	(BIS 10500)
1	pH	4.11	3.76	3.73	4.73	3.63	6.5-8.5
2	Turbidity (NTU)	184	186.2	189	178	189	5
3	DO (mg/l)	1.2	1.3	1.4	1	0.5	5.5-8.5
4	BOD (mg/l)	6	5.9	5.6	6.8	55	20 mg/l
5	Total solids (mg/l)	4680	4920	4816	5536	6972	200 mg/l
6	Suspended solids (mg/l)	55	60	292	32	424	-
7	Dissolved solids (mg/l)	4230	4888	4524	5476	6548	500 mg/l
8	Volatile solids (mg/l)	540	760	1640	288	1984	-
9	Fixed Solids (mg/l)	3888	4160	3176	4814	4988	-
10	Sulphate (mg/l)	433	752.2	530.01	117	1711	150 mg/l
11	Hardness (mg/l)	164	204	248	160	264	300 mg/l
12	Iron (mg/l)	6.8	7.5	7.6	6.4	8.4	0.3 mg/l
13	Fluoride (mg/l)	5.6	3.4	4.8	4.4	6	1.5 mg/l
14	Nitrate (mg/l)	7.7	7.8	15	7.6	15.8	45 mg/l
15	COD (mg/l)	260	280	320	250	499.2	250 mg/l



Graph 1: Parameters with different adsorbents



Graph 2: Parameters with different adsorbents



Graph 3: Parameters with different adsorbents

7. CONCLUSION

- From the graph (1, 2 &3) it is clear that coconut coir proved to be best in reducing the concentration of an effluent. This shows that naturally available fibers can be good adsorbent materials with which concentration of toxic substances, impurities can be reduced.
- Effluent (Wastewater, Industrial Wastewater) is treated and can be reused.
- The sludge obtained along with fibers can be used as manure.
- Fixed bed process in a fixed bed reactor using naturally available low cost media proves essentially a best option to industrialist to prevent environmental pollution.
- Coconut coir fiber rich in cellulose & lignin has high wetting capacity which is essential for bacterial adhesion proves to be efficient than other 3 fibers which are used in the study.
- Natural fibers will be a good medium for biological filter to treat effluent especially with high COD.
- This method of treatment is best suitable for small plants, when the adsorbents are available at reasonable rate.

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Activity Based Costing : A Powerful Management Tool

Paper ID	IJIFR/V3/ E11/ 049	Page No.	4215-4220	Subject Area	Management
Key Words	Cost Drivers, Activity-based costing (ABC), Conventional Costing				

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Abstract

Activity-based costing (ABC) is an accounting method that identifies the activities that a firm performs and then assigns indirect costs to products. An activity-based costing (ABC) system recognizes the relationship between costs, activities and products, and through this relationship, it assigns indirect costs to products less arbitrarily than traditional methods. Some costs are difficult to assign through this method of cost accounting. Indirect costs, such as management and office staff salaries are sometimes difficult to assign to a particular product produced. For this reason, this method has found its niche in the manufacturing sector.

1. INTRODUCTION

Activity-Based Costing (ABC) is that costing in which costs begin with tracing of activities and then to producing the product. In other words, it is the process of costing system which focuses on activities performed to produce products. This system assumes that activities are responsible for the incurrence of costs and products create the demand for activities. Costs are charged to products based on individual product's use of each activity. ABC aims at identifying as many costs as possible to be subsequently accounted as direct cost of production. Any cost that is traced to a particular product via its consumption of activity becomes direct of the product. For instance, in conventional costing system, cost of setup and adjustment time is considered as factory overhead and subsequently assigned to different products on the basis of direct labour hours. But in Activity-Based Costing, setup and adjustment time is determined for each product and its costs are directly charged to each product. Thus by emphasizing activities, ABC tries to ascertain the factors that cause each major activity, cost of such activities and the relationship between activities and products produced. Thus it is defined as: 'An approach to the costing and monitoring of activities which involves tracing resource consumption

and costing final outputs. Resources are assigned to activities, and activities to cost objects based on consumption estimates. The latter utilize cost drivers to attach activity costs to outputs.'

2. OBJECTIVES OF THE STUDY

- To understand the role of on Activity-Based Costing (ABC) as a new costing technique
- To understand the different cost drivers to allocate the overhead
- To know the Difference Between Activity-Based Costing and Conventional Costing

3. RESEARCH METHODOLOGY

The research is exploratory in nature. It focuses on Literature review, News Papers, Journals, websites and the other reliable sources.

4. THE ACTIVITY BASED COSTING PROCESS FLOW

Activity-based costing is best explained by walking through its various steps. They are:

- i.) *Identify costs.* The first step in ABC is to identify those costs that we want to allocate. This is the most critical step in the entire process, since we do not want to waste time with an excessively broad project scope. For example, if we want to determine the full cost of a distribution channel, we will identify advertising and warehousing costs related to that channel, but will ignore research costs, since they are related to products, not channels.
- ii.) *Load secondary cost pools.* Create cost pools for those costs incurred to provide services to other parts of the company, rather than directly supporting a company's products or services. The contents of secondary cost pools typically include computer services and administrative salaries, and similar costs. These costs are later allocated to other cost pools that more directly relate to products and services. There may be several of these secondary cost pools, depending upon the nature of the costs and how they will be allocated.
- iii.) *Load primary cost pools.* Create a set of cost pools for those costs more closely aligned with the production of goods or services. It is very common to have separate cost pools for each product line, since costs tend to occur at this level. Such costs can include research and development, advertising, procurement, and distribution. Similarly, you might consider creating cost pools for each distribution channel, or for each facility. If production batches are of greatly varying lengths, then consider creating cost pools at the batch level, so that you can adequately assign costs based on batch size.
- iv.) *Measure activity drivers.* Use a data collection system to collect information about the activity drivers that are used to allocate the costs in secondary cost pools to primary cost pools, as well as to allocate the costs in primary cost pools to cost objects. It can be expensive to accumulate activity driver information, so use activity drivers for which information is already being collected, where possible.

- v.) *Allocate costs in secondary pools to primary pools.* Use activity drivers to apportion the costs in the secondary cost pools to the primary cost pools.
- vi.) *Charge costs to cost objects.* Use an activity driver to allocate the contents of each primary cost pool to cost objects. There will be a separate activity driver for each cost pool. To allocate the costs, divide the total cost in each cost pool by the total amount of activity in the activity driver, to establish the cost per unit of activity. Then allocate the cost per unit to the cost objects, based on their use of the activity driver.
- vii.) *Formulate reports.* Convert the results of the ABC system into reports for management consumption. For example, if the system was originally designed to accumulate overhead information by geographical sales region, then report on revenues earned in each region, all direct costs, and the overhead derived from the ABC system. This gives management a full cost view of the results generated by each region.
- viii.) *Act on the information.* The most common management reaction to an ABC report is to reduce the quantity of activity drivers used by each cost object. Doing so should reduce the amount of overhead cost being used.

5. ABC & COST DRIVERS

In Activity-Based Costing, activities are identified and classified into different categories that have relationship with the different stages or parts of the production process. The factors that influence the cost of a particular activity are known as "Cost Drivers." A Cost Driver is literally the factors, forces or events that determine the cost of activities. The process of activity-based costing is based on the assumption that cost behaviour is influenced by cost drives. It should be understood that direct costs do not need cost drivers because direct costs are themselves cost drivers. They can be traced by direct relationship with the different parts of product. However, all other factory, office and administrative overheads need cost drives.

Examples of Cost Drivers

In order to trace overhead costs to manufacturing a product, suitable Cost Drivers should be identified. The following are the few examples of Cost Drivers in Activity-Based Costing:

Table 1: Cost Drivers in Activity-Based Costing

<i>Cost Drivers</i>	<i>Activity</i>
i. Number of receiving order	Ordering
ii. Number of deliveries	Delivery
iii. Number of Purchase orders	Order Taking
iv. Kilometers travelled per delivery	Deliveries
v. Number of customers' visits	Customer Visit
vi. Number placing orders for purchase	Placing Orders
vii. Number of returning or empty bottles	Bottles Returns
viii. Number Material handling hours	Product Handling

ix. Amount of labour cost incurred	Labour Transactions
x. Number of inspections	Inspection
xi. Number of physical delivery and receipt of goods	Delivery

6. CLASSIFICATION OF ACTIVITIES

In the first stage of the Activity-Based Costing activities are identified and classified into different categories or segments of the production process. The grouping of activities is preferably done using the different levels at which activities are performed. Broadly, activities are classified into:

- i.) Unit Level Activities
- ii.) Batch Level Activities
- iii.) Product Level Activities
- iv.) Facility Level Activities

(1) Unit Level Activities: Unit Level Activities are those activities which are performed each time a single product or unit is produced. These activities are repetitive in nature. For example, direct labour hours, machine hours, powers etc. are the activities used for each time for producing a single unit. Direct materials and direct labour activities are also unit level activities, although they do not overhead costs. Cost of unit level activity vary with the number of units produced.

(2) Batch Level Activity: These activities which are performed each time a batch of products or group of identical products are produced. All the units of a particular batch are uniform in nature and in size. The cost of batch level activities vary with the number of batches are ascertained. Machine setups, inspections, production scheduling, materials handling are examples of batch level activities which are related to batches.

(3) Product Level Activities: These activities which are performed to support the production of each different type of product. Maintenance of equipment, engineering charges, testing routines, maintaining bills of materials etc. are the few examples of product level activities.

(4) Facility Level Activities: Facility Level Activities are those which are needed to sustain a factory's general manufacturing process. These activities are common to a variety of products and are most difficult to link to product specific activities. Factory management, maintenance, security, plant depreciation are the few examples of facility level activities.

Table 2: Difference between Activity-Based Costing and Conventional Costing

<i>Activity-Based Costing</i>	<i>Conventional Costing (or) Traditional Costing</i>
(I) It begins with identifying activities and then to producing the products	(1) It begins with identifying cost and then to producing the products
(2) It mainly focuses on activities performed to produce products	(2) It emphasises mainly on ascertainment of costs after they have been incurred
(3) Cost Drivers used for identifying the factors that influence the cost of	(3) Cost unit is used for allocation and accumulation of costs

<p>particular activity</p> <p>(4) Overhead costs are assigned to Cost Centre or Cost Pools</p> <p>(5) Overhead costs are assigned to products using Cost Drivers Rates</p> <p>(6) Variable overhead is appropriately identified to individual products</p> <p>(7) In ABC many activity based on Cost Pools or Cost Centers are created</p> <p>(8) There is no need to allocate and redistribution of overhead of service departments to production departments</p> <p>(9) It assumes that fixed overhead costs vary in proportion to changes in the volume of output.</p>	<p>(4) Overhead costs are assigned to production departments or service departments</p> <p>(5) Overheads allocated on the basis of departmental overhead allocation rate</p> <p>(6) Costs may be allocated or assigned either on actual cost incurred or on standard cost basis</p> <p>(7) Overheads are pooled and collected department wise</p> <p>(8) The process of allocation and re-distribution of the costs of the service departments to production department is essential to find out total cost of production</p> <p>(9) It assumes that fixed overheads do not vary with changes in the volume of output.</p>
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7. CONCLUSION

ABC is a powerful management tool that has evolved in response to the ineffectiveness of traditional cost accounting and cost management practices. Advocates of ABC have been won over following their realization that the general ledger's cost center and chart of account expense data is structurally deficient in calculating costs and providing cost visibility and driver understanding. They realize that broad-based cost allocations create grotesquely distorted and misleading costs compared to tracing costs with ABC principles. The adoption rate of ABC is propelled by increasing proliferation of all businesses outputs (including types of suppliers, products, services, channels, and customers) that cause increased complexity and increased indirect expenses to manage the complexity. As important as it is, however, ABC is not a panacea. As mentioned earlier, cost management should always be done in the broader context of performance management that integrates time, quality, service levels, risk, capacity planning, and costs. Given that, it is critical that an organization understands its cost structure. Having a management accounting system that supports that understanding, such as ABC, is critical for all of its stakeholders—its employees, its community, its loyal customers, and its shareholders.

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Private Communication Between Mobile Devices Using Smartphone Application

Paper ID	IJIFR/V3/ E11/ 050	Page No.	4221-4227	Subject Area	Computer Sci. & Engineering
KeyWords	Smartphones, Android, Internet Protocol, SAHANA, Disasters, Training				

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Abstract

Mobile calling applications are gaining pace with the advent of faster data access. All these applications require connectivity to the internet or assistance from the third party. If the internet connection is slow then the call may get disconnected or clarity of voice will not be there. This project provides a solution to establish an intra-network communication. As in campus or in the company the students can communicate using their mobile phones with each other without the internet connection through VOIP (voice over internet protocol) so that all people can access facilities, like extension phone even if the internet is blocked. This will enable free calling across the campus and also enable futuristic value added education services. The considered functions are implemented as an application in a smartphone using an Android operating system. A user can install the proposed application in advance and make use of it the possibilities of examination of the new digital.

1. INTRODUCTION

Smart phones are called as mobile phones were they operate on more than one features and they can do better than the other mobiles. They are small hand held telephones with colourful screens, multiple sensor technologies, and multiple networks capable of exchanging data. Smart phone communication has become faster they can send and receive the data much faster than older phones. Today smart phones are used in these areas, the emergence of phones with wireless internet connections and the development of the ad hoc networking systems, as well as the ability to quickly deploy battery-based mesh networking equipment, will allow smartphones to have considerable utility in future disasters. It has been suggested that peer to peer networks comprised of cell Phones could be used to allow (possibly limited) communication in such an event. Thus the expectation is that the communication issues can be addressed by these new technologies, and in particular complete the use of a combination of wireless networks found on modern smartphones.

1.1 Background

Android is a Linux-based mobile phone operating system is developed by Google. Android is unique because Google is actively developing the platform, but giving it away for free to hardware manufacturers and phone carriers who want to use Android on their devices. Android is an open source operating system for mobile devices that includes middleware and key application, and uses a modified version of the Linux kernel.

2. LITERATURE SURVEY

Recently there have also been a number of applications for smartphones targeted specifically at emergency response. The most famous of these is the “Fire Department” 15 app from the Ramon Valley Fire Protection District. This application provides users with information about recent emergency events on a map. It also can be used to find the location of an automated defibrillator. This application requires that the phone be connected to the internet in order to operate properly. Such an application could be rebuilt using our approach relatively easily, allowing users to share data on recent events in an ad-hoc fashion. Also of significant interest is the SAHANA foundation project, which aims to provide a set of modular, web-based disaster management.

Applications developed as part of SAHANA include a Missing Person Registry, an Organization Registry, Request and Pledge Management System, Shelter Registry, Inventory Management, Situation Awareness, and Volunteer co-ordination. SAHANA also includes tools Situation for synchronization between multiple instance allowing for responders or district Situation Awareness, and Volunteer coordination. SAHANA also includes tools for synchronization between multiple instances, allowing for responders or district offices to capture data on victims in the field and exchange the data with the other field offices, headquarters or responders. SAHANA also includes synchronization features to synchronize multiple instances. Because SAHANA is a web-based framework, it has the problem of relying on communication to the centralized web-server, and thus cannot

take advantage of mobile nodes making disconnected operations. Furthermore, users do not have access to the data in the SAHANA system when they are offline. Furthermore, we note that the synchronization framework in SAHANA relies entirely on modification timestamps and is thus subject to the problem of unsynchronized. Clocks on mobile devices leading to incorrect conflict recognition. Furthermore, the applications in SAHANA cannot be changed by users of the software, and are thus not easy to adapt to meet the previously unknown needs of users when disaster strikes.

3. SYSTEM ARCHITECTURE

Architecture is defined as the art of designing structures and creating buildings and it is also called where components of a computer system are integrated and organized.

The Architecture

The essential infrastructure contains a Tracker Server and a video server. In the simplest case, only a solo instance of each module exists in the system. To increase the reliability and the performance of the system, one could always use further, terminated instances of each module. The video server needs to register his content at the tracker server to be able to stream video content. In the proposed system, each video outcomes in an own dissemination swarm, i.e. only the peers watching the same video exchange video data. The process of joining of the swarm, that is watching and redistributing a chosen video, can be described as follows upon registration at the tracker server, each peer receives a unique identifier (Peer ID or IP address).

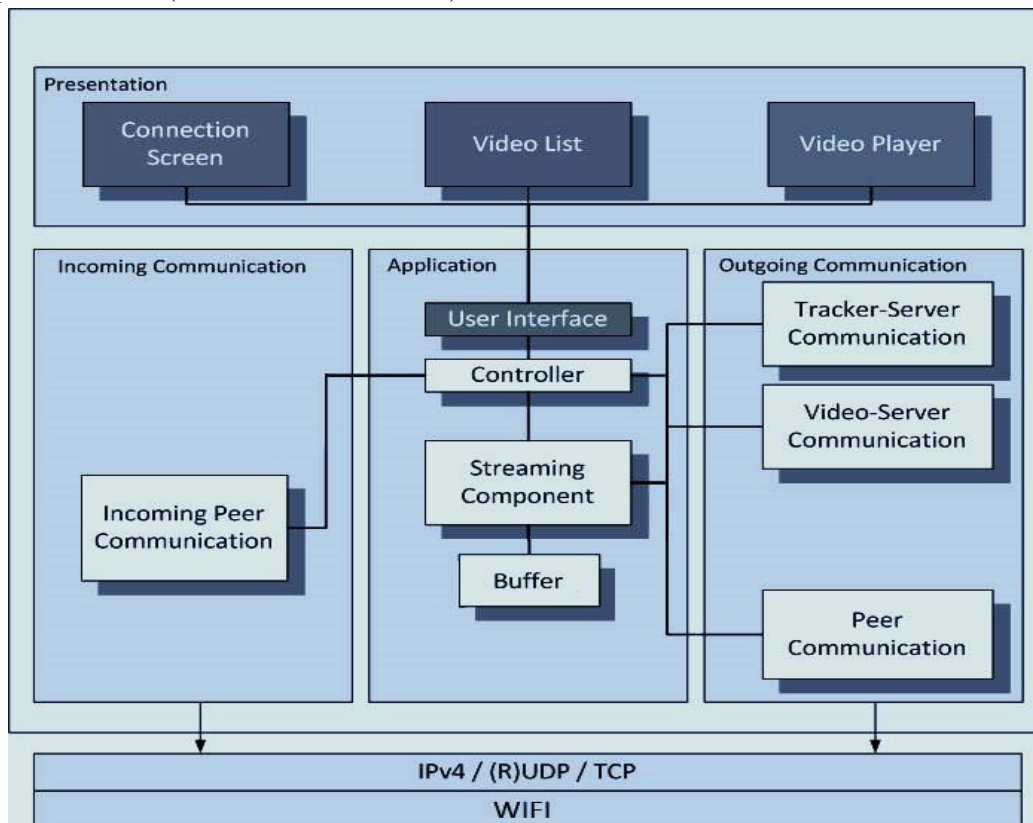


Figure 1: Architecture of the system

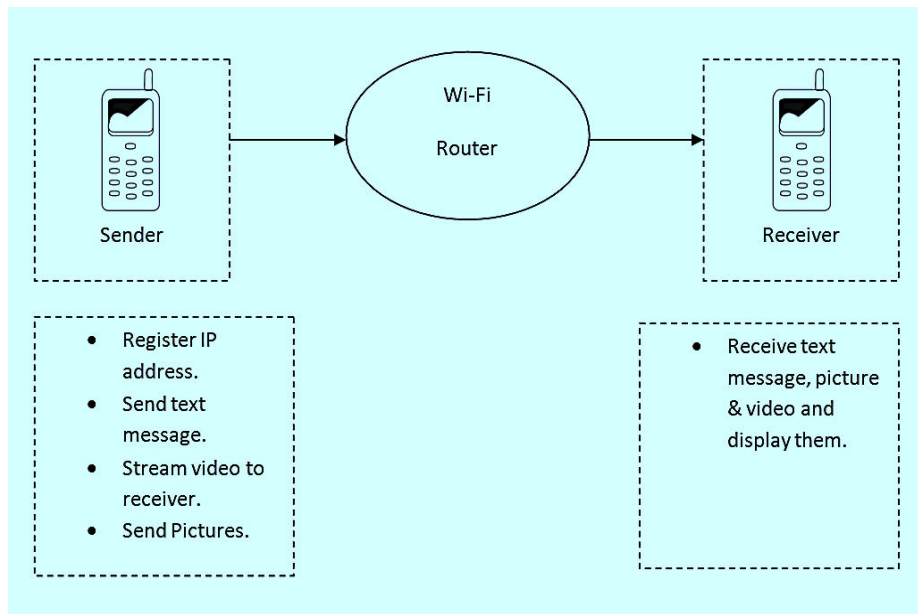


Figure 2: System Design

4. IMPLEMENTATION

Implementation of software refers to the final installation of the package in its real environment to the satisfaction of the intended users and the operation of the system. The people are not sure that the software is meant to make their job easier.

- The active user must be aware of the benefits of using the system
- Their confidence in the software built up.
- Proper guidance is impaired to the users so that he is comfortable in using the application.

Before going ahead and viewing the system, the user must know that for viewing the results, the server program should be running in the server. If the Server object is not running on the server, the actual processes will not take place. Benefits expected from the propose system it is essential for the people who will be involve to be confident of their roles in the new system. The systems become more complex the needs for education and training is more and more important .Education is complementary to training .It brings life to formal training by explaining the background to the resources for them . Education involves creating the right atmosphere and motivating user's staff. Education information can make training for interesting and more understanding.

Training on the Application Software

After providing the necessary basic training on the computer awareness user has to be train on the new application software these will give the underline philosophy of the use of the new system such as screen flow, screen design, type of help on the screen, type of error

Operational Documentation

Once the implementation is decided, it is essential that the users of the systems is made familiar and comfortable with the environment documentation providing the whole

operation of the systems is being developed useful tips and guidance is given inside the application itself to the user. The system is developed user friendly so that the user can work the system from the tips given in the application itself. The need for the system maintenance is to make adaptable to the change in the There may be social technical and other environment changes in the system which is being implemented. Software product enchantment may evolved providing new function capabilities , improving user displays and mode of interaction, upgrading the performance characteristics of the system's only through proper system maintenance procedures ,the system can be adopted to cope up with these changes .Software maintenance of course ,far more than “finding mistakes”.

5. RESULTS



Figure 3 : Selection of the IP of the receiver

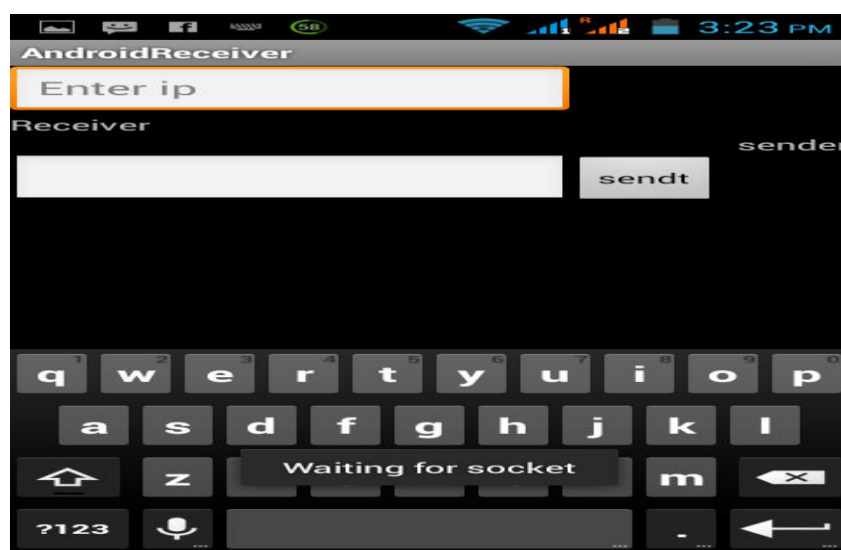


Figure 4: Text Message Interface (Receiver)



Figure 5: Selection of the IP of the receiver

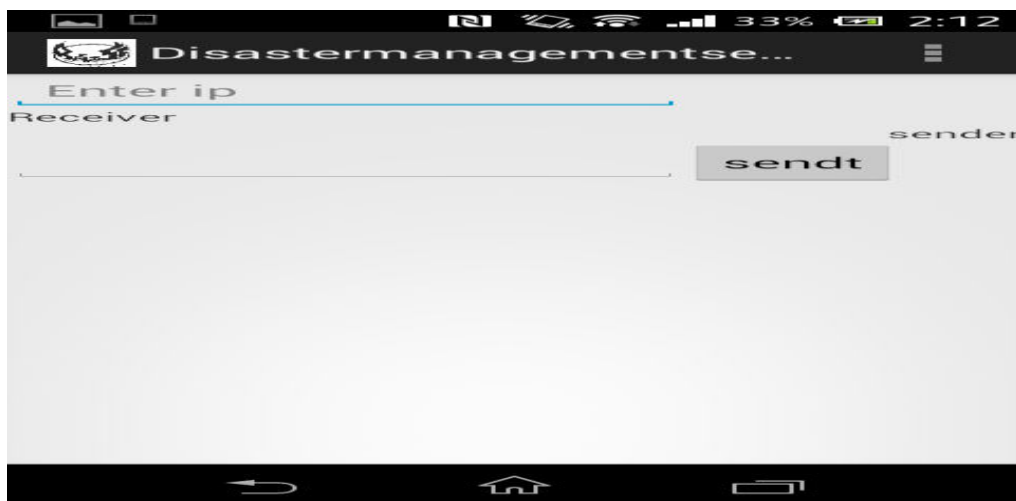


Figure 6: Text message interface (Sender)

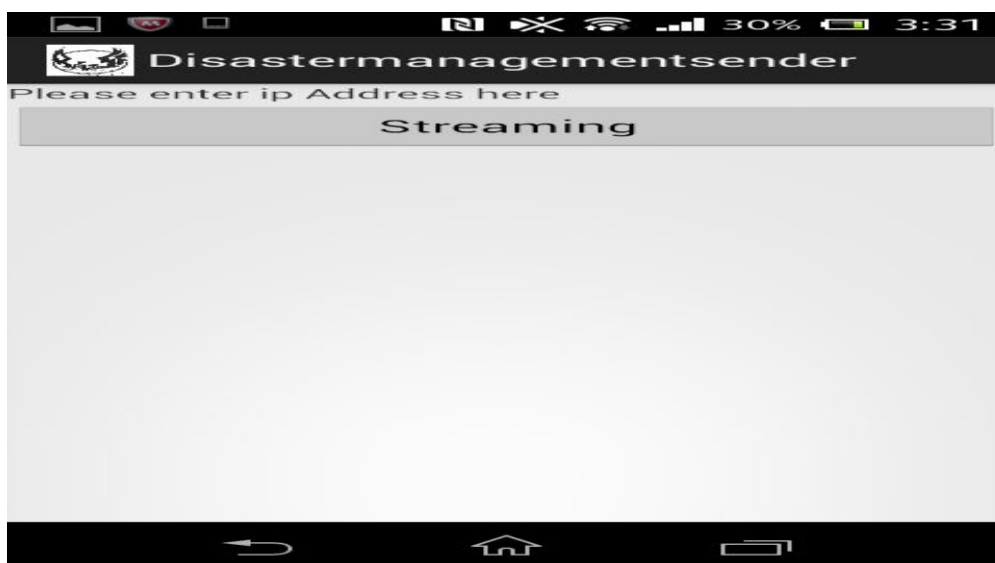


Figure 7: Video option at sender

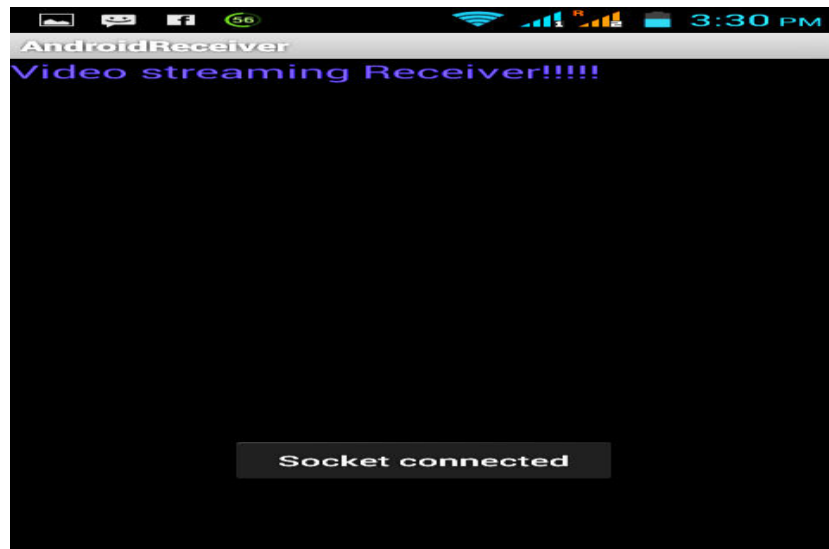


Figure 8: Video option at receiver end

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Teachers' Self Efficacy Scale: Construction And Validation

Paper ID

IJIFR/V3/ E11/ 035

Page No.

4228-4240

Subject Area

Education

Key Words

Domain Specific Self- Efficacy, General Self- Efficacy, Universal constructs Of Self- Efficacy

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Abstract

Self- Efficacy is in fact a functionary expression of the concept "Self-Competent relief". It is a behavioural feature found in individual in varying degrees decided by the intensity of trust on oneself at feeling level, thinking level and at functional (action) level. In developing an instrument for assessing Self- Efficacy of teachers, the need for considering the individuals' domain of activity was theoretically established and proved by adopting the domain of teaching. Evidences of different validities were recorded along with the measure of reliability. The presence of universal constructs of Self- Efficacy - Depression, Anxiety, and Optimism in the newly prepared instrument is shown through the process of verifying its criterion related validity. The researcher confirms the utility of the areas of teaching activity – Individual Growth Oriented Practices (IGOP), Instructional Practices (IP), and Social Emotional Practices (SEP) in assessing teachers' Self- Efficacy, by confirmatory factor analysis.

1. INTRODUCTION

The personal sense of control is the basic factor driving an individual to function in a way appropriate to his / her perception. The theory of self-efficacy proposes the same for the occurrences of behavioural change and different forms of psychotherapy (Bandura, 1977). If an individual believes in his / her strength to solve a problem, the inclination towards the task would become more intense with more commitment to execute the decision. Naturally, self-referent thought has become a focus of many of the psychological researches involving different domains. They have reported significant correlation

between individuals' Self efficacy and their higher achievement, higher social integration and better health condition. According to Bandura (1995a), Maddux (1994) and others the concept self-efficacy is applicable to areas such as school achievement, emotional disorders, mental and physical health, career choice and socio-political change. This is what impelled the researcher to go through the literature on self-efficacy to develop an instrument to assess the same on the domain of teaching, barring the impact of culture and language.

2. RATIONALE

Bandura (1995a, 1995b) has reported that people differ in their feeling, thinking and acting due to difference in their self-efficacy. More elaborately, at the 'feeling' level a low sense of self efficacy is attributed for depression, anxiety, and helplessness leading to low self-esteem and pessimistic thoughts. Similarly, at 'thinking' level a strong sense of self efficacy, positively promotes cognitive processes and performance. At 'action' level, higher sense of self efficacy enhances 'motivation' so as to set higher goals and stick to working towards them. Consequently a sense of competence may be achieved by higher level performances, thereby taking the individual to the level of 'higher performer' in tune with his / her capabilities.

Self-efficacy is often treated as domain specific. It is based on the assumption that one's strength of self-efficacy is likely to change depending on the domain in which the individual has to function. In this case, for assessing self-efficacy of individuals, domain - based instruments are to be used. However, many of the researchers favour the adequacy of generalized sense of self efficacy which in fact refers to a global confidence in one's ability to cope with a wide range of challenging situations. Synder et al, (1991) have pointed out 'hope' as the construct of self-efficacy which is said to be composed of successful 'agency' and 'pathways'. Skinner and Baltes (1988) speak of similar construct, whereas Sheier and Carver (1985, 1992) contradict such as dispositional optimism, enabling Schwarzer (1994) to state that generalized self-efficacy is formed of one's 'personal resource beliefs' regarding only competence without any consideration of other sources of optimism. Therefore, self-efficacy scales incorporating 'generalized constructs' are more adequate to predict and treat anxiety, depression and other mental dispositions (Schwarzer, 1993) of individuals functioning under different domains.

3. LITERATURE REVIEW

The researcher reviewed available literature pertaining to instruments for assessing self-efficacy. All these instruments downloaded from websites are the ones standardized on populations other than that of India. Of these the best known instrument is 'General Self Efficacy Scale' developed by Jerusalem and Schwarzer in 1986. The original version is in German language. It has the reputation of being translated into several languages such as English, Spanish, Chinese, French, Hebrew, Hungarian, Turkish, Czech, and Slovak. The original instrument has established norms on a sample of 1660 German adults. The

manual furnishes details of its test-retest reliability and experimental, criterion related, and predictive validity.

However, the researcher is of the view, that though general self-efficacy is of the construct optimism related to achievement, a universal construct free from all culture, to elicit and identify the nature of experience in forming 'personal resource beliefs' about one's competence, statements pertaining to areas of activity possible for a particular domain need to be used as test items. This is the reason why domain related self-efficacy scales are being developed.

'Teachers' Sense of Efficacy Scale' (TSES) developed by Tschanmen – Moragn and Woolfolk (2001) is widely used in the field of teaching to identify teachers sense of efficacy in respect of Student engagement, Instructional practices and Classroom management treating them as dominant areas of activities for a teacher. The long form of the tool consists of 24 items, whereas the short form has 12 items, which are to be rated on a nine point scale ranging from 'nothing' to 'a great deal'. Different kinds validity have been established, and the computed alpha values 0.94 and 0.90 for long form and short form respectively confirm its reliability.

On looking into the structure of TSES, it is found that the dimensions Student engagement, Instructional practices and Classroom practices are treated as three distinct areas of activity. But if we theoretically analyse the components that go into the making of each dimension, it is understood that all those components forming 'Student Engagement' and 'Classroom Management' could also come under the dimension 'Instructional Practices'. eg. 1. How much can you do to help your students think critically (Item No. 2), 2. How much can you do to adjust your lessons for the proper level to the individual students (Item No. 17) 3. How well can you provide appropriate challenges for very capable students (Item No. 24).

Moreover, teachers' distinct role of 'individual growth oriented practices' and another role 'social – emotional practices' for equipping the students with proper social and emotional characteristics are not explicit in the TSES. Naturally, an instrument incorporating such distinct areas of activity may look more comprehensive and adequate.

It is also more illuminating to know that all the General Self Efficacy Scales ranging from German version of general efficacy scale of Jerusalem and Schwarzer (1981), to 'Teachers' Sense Of Efficacy Scale' of Tschanmen – Moragn and Woolfolk (2001) are found to have the constructs: depression, trait anxiety, and optimism. From these, the researcher concludes that irrespective of the number or type of areas of activity included for the preparation of statements, they should reflect the uni-dimensional nature and the characteristics of disposition, trait anxiety and optimism.

4. INFERENCE TO THE STUDY

- i. In order to materialize the intention of developing a valid and reliable instrument for assessing general self-efficacy of teachers, the researcher has chosen the areas of activity as: Individual Growth Oriented Practices (IGOP); Instructional Practices (IP);

and Social-Emotional Practices (SEP) – the possible dimensions for the preparation of statements.

- ii. The Items should reflect the presence or absence of sense of efficacy at feeling level (depression), thinking level (trait anxiety), and at the action level (optimism).
- iii. Validation process of the Draft Tool should include confirming content validity, item validity, construct validity, criterion related validity, factorial validity and its reliability.

5. PREPARATION OF TEST ITEMS

Dimension I (IGOP)

- i. How much can you do to help a poor achiever involve effectively in learning activities?
- ii. How well can you help your very capable students achieve still better?
- iii. How much can you help students not attentive in the class gain interest to participate in academic works?
- iv. To what extent can you assess the many sided interest of your students?
- v. How well can you draw out the hidden talents of your students in different fields?
- vi. How much can you educate families to promote the achievement of their children in their fields of interest?
- vii. How well can you guide competent students of school subjects to realize their aptitude in another field?
- viii. To what extent can you help competent students of sports and games to improve their academic performances?
- ix. How well can you help students at the verge of frustration to manage the pressure of school work?
- x. How much can you help your students become physically strong and mentally healthy?

Dimension II (IP)

- i. How much can you motivate your students to show interest in class works?
- ii. To what extent can you make the aims of teaching a lesson clear to your students?
- iii. How well can you solve the difficulties of your students in understanding a new concept?
- iv. How well can you assess the comprehension of your students in the subject you taught?
- v. How well can you design practicals for your students to develop creative thinking?
- vi. How well can you structure your teaching to suit the level of students?
- vii. To what extent can you frame questions to test the understanding at different levels?
- viii. How much proficient are you to provide variety of assignments suitable to students of different calibre?
- ix. How well can you implement alternative strategies during the course of teaching?
- x. To what extent can you help your students enjoy freedom in the teaching-learning process?

Dimension III (SEP)

- i. To what extent can you correct the problem students by adopting corrective measures?
- ii. How well can you manage the difficult student in the class?

- iii. How well can you handle moral problems without hurting the feelings of students?
- iv. To what extent can you strengthen the 'we' feeling among the students?
- v. How well can you tackle indifferent students in the class?
- vi. How much do you hope to train your students to cope with the pressure of school and their home?
- vii. How much can you do to get children follow classroom rules?
- viii. How well can you make the disturbing students realize their mistakes in an honest way?
- ix. To what extent can you keep your students emotionally balanced at all times in the school?
- x. To what extent can you introduce novel programmes to cultivate social-emotional skills in students?

6. DRAFT TOOL

The following table furnishes the number of statements prepared for the Teachers' Self Efficacy Scale

Table 1: Dimension wise number of statements of the Teachers' Self Efficacy Scale

S.No.	Dimension	No. of Items
1	Individual Growth Oriented Practices	10
2	Instructional Practices	10
3	Social Emotional Practices	10
Total		30

7. VALIDATION OF THE TOOL

Validity of an instrument is the degree to which it measures, what it is supposed to measure. Validity of the present instrument is tested in terms of content validity, item validity, construct validity, criterion related validity and factorial validity.

- I. **Content validity:** Copies of the Draft Tool were provided to three Experts guiding Doctoral studies in Education in other universities with a request to study the appropriateness of the statements prepared and offer suggestions for better alterations or modifications. On the basis of the suggestions provided by the experts changes were made in some of the statements, establishing the content validity of the tool.
- II. **Item Validity:** To establish the statistical validity, the modified Draft tool was administered to 100 teachers working in schools in Trichy District. After scoring the responses of the respondents, the validity of each item has been established by subjecting the data to Goodness of Fit Test, which is otherwise called one sample test of chi square. It is one of the several applications of chi square test (Cohen Louis, 1976). Here it is used to test the null hypothesis formed for every statement in the draft tool that the responses obtained under the nine point scale ranging from 'very little' to 'at a great deal' are not by choice

Table 2: Goodness of Fit Value of Items of Teachers' Self Efficacy Scale

Item No.	Goodness of Fit Value	Table Value at 0.01 Level	Remark	Item No.	Goodness of Fit Value	Table Value at 0.01 Level	Remark
1	27.51	20.09	Rejected	16	30.48	20.09	Rejected
2	35.29	20.09	Rejected	17	26.32	20.09	Rejected
3	29.38	20.09	Rejected	18	42.08	20.09	Rejected
4	28.62	20.09	Rejected	19	31.29	20.09	Rejected
5	29.45	20.09	Rejected	20	10.55*	20.09	Accepted
6	27.92	20.09	Rejected	21	28.46	20.09	Rejected
7	31.28	20.09	Rejected	22	26.46	20.09	Rejected
8	34.15	20.09	Rejected	23	34.27	20.09	Rejected
9	42.61	20.09	Rejected	24	26.44	20.09	Rejected
10	28.52	20.09	Rejected	25	38.32	20.09	Rejected
11	37.62	20.09	Rejected	26	25.64	20.09	Rejected
12	24.58	20.09	Rejected	27	23.51	20.09	Rejected
13	22.62	20.09	Rejected	28	27.45	20.09	Rejected
14	24.28	20.09	Rejected	29	33.16	20.09	Rejected
15	31.55	20.09	Rejected	30	28.54	20.09	Rejected

The above table furnishes the Goodness of Fit value for each one of the 30 items. The table shows that by deleting item number 20, the remaining 29 Statements are to be retained because the stated null hypotheses for these statements are rejected at 0.01 levels.

Construct Validity: Using the tabulated data, the Item - Dimension total correlation was computed for each Statement to establish the construct validity of the newly formed tool. Dimensions such as 'Individual Growth Oriented Practices', 'Instructional Practices' and 'Social Emotional Practices' are incorporated in the Statements. Table – 3 reveals the Item - Dimension total correlation for the 29 items.

Table 3: Item – Dimension Total Correlation value of Teachers' Self Efficacy Scale

Item No.	r value	Item No.	r value	Item No.	r value	Item No.	r value
1	0.45	9	0.54	17	0.51	25	0.35
2	0.42	10	0.55	18	0.44	26	0.49
3	0.62	11	0.46	19	0.36	27	0.45
4	0.39	12	0.33	20	0.58	28	0.47
5	0.43	13	0.42	21	0.64	29	0.31
6	0.38	14	0.50	22	0.39		
7	0.04*	15	0.28	23	0.38		
8	0.46	16	0.34	24	0.02*		

* items deleted

From the above table it may be seen that 27 Statements are significantly correlated with their respective dimensions, hence retained in the scale; whereas two statements not securing significant correlation with their dimensions were deleted. Thereafter, dimension total – total composite score correlation was computed. Table 4 gives the results of the computation.

Table 4: Dimension Total - Total Composite Score Correlation of Teachers' Self Efficacy Scale

S. No.	Dimension	'r' value	Significance
1	Individual Growth Oriented Practices	0.58	0.00
2	Instructional Practices	0.74	0.00
3	Social Emotional Practices	0.63	0.00

Since the correlation between dimensions and total score of Teachers' Self Efficacy Scale is significant at 1% level, the contribution of dimensions to the total score is confirmed.

III. Criterion Related Validity:

Self-efficacy has already been established as a trait composed of the constructs Depression, Anxiety and Optimism. To establish the presence of these criteria in the test items of the newly formed scale, the draft tool was administered along with 1. Geriatric Depression Scale (GDS) by Sheery A. Greenberg (2012); 2. Hamilton Anxiety Rating Scale (HARS) by Hamilton (1959); and 3. Positivity Scale by Centre for Ethical Education, Notre Dame University (2006) to estimate the relationship between the criteria depression, anxiety and optimism and the criterion variable self-efficacy of the newly prepared research instrument. All the instruments were administered to 50 teachers randomly selected from different schools in Trichy and the respondents were tabulated and subjected to correlation analysis. The computation yielded the following results.

Table 5: Correlation between TSES and criterion related variables

S. No.	Criteria	Criterion related variable	'r' value	Level of Significance
1	Teachers' Self Efficacy Scale	Geriatric Depression Scale	0.76	0.00
2		Hamilton Anxiety Scale	0.82	0.00
3		Positivity Scale	0.79	0.00

It is understood from table 5 that all the three criteria depression, anxiety and optimism are found to be significant constructs of the variable self-efficacy.

IV. Factorial Validity:

Finally the researcher has decided to make the process of validation complete by Factor Analysis. The partially validated draft tool with jumbled items of the three dimensions was again administered to 100 subjects chosen by random from various schools of the same district. The tabulated data were subjected to Factor Analysis. The process of factor analysis started with the extraction of communality values for all the 27 items finalized in the draft tool. The values are provided in Table 6.

Table 6: Commuality values of Teachers' Self Efficacy Scale

Item No	Commuality value	Item No	Commuality value	Item No	Commuality value
1	0.75	2	0.78	3	0.83
4	0.85	5	0.76	6	0.94
7	0.83	8	0.69	9	0.79
10	0.69	11	0.87	12	0.92
13	0.87	14	0.89	15	0.85
16	0.75	17	0.91	18	0.94
19	0.79	20	0.83	21	0.86
22	0.73	24	0.71	25	0.79
25	0.82	26	0.76	27	0.81

Table 6 furnishes the extracted commuality values for all the 27 items ranging from 0.69 to 0.94, proving their suitability to be included in the tool.

7. EXTRACTION METHOD: PRINCIPAL COMPONENT ANALYSIS

Following the computation of total variance, the initial Eigen values leading to extraction of sums of squared loadings was done and the results are furnished in Table 7.

Table 7: Total variance explained – Eigen values – extraction of squared loadings for Teachers' Self Efficacy Scale

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings	Component	Rotation Sums of Squared Loadings	
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %			% of Variance	Cumulative %
1	3.12	11.57	11.57	3.12	11.57	11.57	2.11	1	7.84	7.84
2	2.23	8.27	19.85	2.23	8.27	19.85	2.04	2	7.56	15.41
3	1.92	7.12	26.97	1.92	7.12	26.97	1.77	3	6.57	21.98
4	1.81	6.71	33.69	1.81	6.71	33.69	1.74	4	6.46	28.44
5	1.77	6.58	40.27	1.77	6.58	40.27	1.67	5	6.19	34.64
6	1.53	5.68	45.95	1.53	5.68	45.95	1.63	6	6.05	40.69
7	1.44	5.36	51.32	1.44	5.36	51.32	1.62	7	6.01	46.70
8	1.39	5.15	56.47	1.39	5.15	56.47	1.61	8	5.96	52.67
9	1.26	4.66	61.13	1.26	4.66	61.13	1.55	9	5.75	58.42
10	1.10	4.08	65.22	1.10	4.08	65.22	1.50	10	5.57	63.99
11	1.09	4.03	69.25	1.09	4.03	69.25	1.42	11	5.25	69.25
12	.95	3.51	72.77					12		
13	.91	3.39	76.17					13		

14	.80	2.99	79.16	14
15	.74	2.77	81.94	15
16	.66	2.47	84.41	16
17	.63	2.35	86.76	17
18	.62	2.32	89.08	18
19	.48	1.81	90.89	19
20	.46	1.71	92.61	20
21	.43	1.62	94.23	21
22	.36	1.354	95.58	22
23	.31	1.16	96.75	23
24	.27	1.02	97.78	24
25	.24	.89	98.67	25
26	.20	.74	99.42	26
27	.15	.57	100.00	27

From the Table 7, it may be understood that the eleven components have secured initial Eigen values explaining 4.03% to 11.57% of variance. Moreover, the sums of extracted squared loadings reveal that the first eleven components account for 69.25% of the composite score value. The sums of squared values computed by varimax rotation reveal that the first three components are distinct, scoring 7.12 and above, whereas the components above 3 are not distinctly independent as they have scored less than 7.00. Therefore, the eleven components are subjected to the principal component analysis with rotation method of Kaiser normalization to yield loadings for all the twenty seven items on the eleven components. Table 8 provides the rotated component matrix.

Table 8: Principal Component Analysis values of Teachers' Self Efficacy Scale

Items	Components										
	1	2	3	4	5	6	7	8	9	10	11
Item1	.324	.045	.043	.025	.064	.128	.013	.021	.098	.043	.249
Item2	.083	.364	-.103	.313	.303	.098	.136	.023	.110	.274	.095
Item3	-.047	-.062	.250	.281	.051	.303	.145	.388	.075	.026	.106
Item4	.254	.100	-.040	.005	.446	.307	.298	.166	.133	.114	.147
Item5	-.074	.269	-.009	.097	.033	.102	.100	.125	.202	.386	.080
Item6	-.023	-.037	.213	.162	.124	.096	.285	.112	.048	.048	.028
Item7	.216	.049	-.048	.193	.006	.032	.048	.035	.132	.025	.030
Item8	.004	.232	-.034	.023	.010	.079	.025	.034	.088	.089	.004
Item9	-.008	.033	.242	.059	.756	.109	.150	.107	.081	.046	.223
Item10	.322	-.008	-.017	.177	.254	.067	.073	.024	.123	.114	.257
Item11	.104	.155	-.028	.010	.031	.813	.085	.049	.128	.076	.207
Item12	.050	-.172	.267	.430	.046	.053	.182	.094	.281	.064	.076
Item13	.249	-.029	.016	.065	.059	.214	.124	.281	.051	.064	.205
Item14	-.055	.255	.051	.049	.207	.065	.064	.005	.446	.026	.065

Item15	-.050	-.102	.191	.301	.019	.034	.401	.097	.033	.008	.037
Item16	.354	.204	.164	.026	.406	.039	.085	.162	.124	.104	.156
Item17	.062	.304	.248	.035	.035	.035	.367	.193	.006	.201	.106
Item18	.045	.058	.252	.235	.049	.109	.043	.023	.010	.064	.147
Item19	.356	.106	.264	.046	.120	.095	.120	.059	.125	.008	.080
Item20	.326	.304	.079	.037	.064	.076	.164	.305	.106	.064	.028
Item21	.064	.309	.337	.085	.092	.102	.204	.114	.147	.206	.059
Item22	.338	.095	.204	.064	.086	.064	.064	.306	.080	.301	.064
Item23	.267	.376	.038	.208	.006	.065	.083	.048	.028	.210	.359
Item24	.462	.037	.091	.106	.049	.049	.305	.025	.030	.032	.207
Item25	.291	.058	.073	.207	.106	.301	.043	.089	.004	.264	.019
Item26	.043	.462	.064	.064	.173	.026	.062	.520	.046	.082	.006
Item27	.034	.054	.302	.009	.095	.210	.043	.062	.038	.009	.035

Table 8 furnishes the factor loadings of the following items significant enough to come under the component-1. Altogether 9 items are found to contribute for the component -1. Similarly, nine items out of twenty seven in TSES are found to have factor loading significant enough to fall under component - 2. Under component- 3 nine test items are to be included as they seem to have high factorial loadings.

However, items - 16, 17, 18, 19, 20, 21, 22, 23, and 25 are found to have secured high factorial loadings under other components also apart from recording high loadings on the first three components. Therefore, from the nature of the items it may be assumed that component – 1 stands for IGOP; component -2 IP; and component -3 SEP; though they are also good enough to assess other components which may be subsumed under or related to the first three components. It is concluded therefore that the theoretically established dimensions **Individual Growth Oriented Practices (IGOP), Instructional Practices (IP), and Social Emotional Practices (SEP)** are found to have been incorporated in the newly developed instruments to study Teachers' Self Efficacy.

8. DIMENSION WISE ITEM CATEGORIZATION

The items meant for different dimensions of the final form of the tool are furnished in table 9.

Table 9: Items of the Teachers' Self Efficacy Scale – Dimension wise

Dimensions	Statements
Individual Growth Oriented Practices	1, 4, 7, 10, 13, 16, 19, 22, 25
Instructional Practices	2, 5, 8, 11, 14, 17, 20, 23, 26
Social Emotional Practices	3, 6, 9, 12, 15, 18, 21, 24, 27

Reliability

The reliability coefficient of the tool has been established by Cronbach's Alpha method. The computed reliability coefficient **0.895** shows that the tool is highly reliable. Thereafter to verify the internal consistency of the prepared instrument the Cronbach's Alpha test was extended to yield alpha value for each one of the 27 items by excluding the

contribution of each individual item on the total composite score of the tool. The results of computation are given in Table 10.

Table 10: Cronbach's alpha value of items of Teachers' Self Efficacy Scale

S. No.	Corrected Item Total Correlation	Cronbach's Alpha if item deleted	S. No.	Corrected Item Total Correlation	Cronbach's Alpha if item deleted
1	0.749	0.849	15	0.734	0.811
2	0.728	0.824	16	0.804	0.798
3	0.798	0.811	17	0.815	0.724
4	0.748	0.872	18	0.749	0.801
5	0.764	0.809	19	0.731	0.846
6	0.739	0.830	20	0.702	0.814
7	0.804	0.795	21	0.801	0.799
8	0.825	0.783	22	0.804	0.854
9	0.794	0.824	23	0.834	0.864
10	0.728	0.864	24	0.792	0.809
11	0.796	0.843	25	0.783	0.845
12	0.734	0.811	26	0.804	0.862
13	0.764	0.805	27	0.811	0.855
14	0.729	0.792			

The computed values of Cronbach's Alpha uphold the internal consistency of the instrument.

8.1 Scoring Scheme

The 27 items of the scale are in statement form. For each item the respondent is to show his / her preference by putting tick mark under the scale ranging from 1 – Very Little to 9 – at a Great Deal. The scheme of scoring is given hereunder.

Table 11: Scoring scheme of Teachers' Self Efficacy Scale

Item No.	Score								
	1 - Very Little	2	3	4	5	6	7	8	9 – At a Great Deal
1,2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27	1	2	3	4	5	6	7	8	9

9. FINAL FORM OF TEACHERS' SELF EFFICACY SCALE

Table 12: Final Form-Teachers' Self Efficacy Scale

S. No.	Statement	1 Very Little	2	3	4	5	6	7	8	9 at a Great Deal
1	How much can you do to help a poor achiever involve effectively in learning activities?									
2	How much can you motivate your students to show									

[illegible]

24	To what extent can you keep your students emotionally balanced at all times in the schools?							
25	How much can you help your students become physically strong and mentally healthy?							
26	How well can you implement alternative strategies during the course of teaching?							
27	To what extent can you introduce novel programmes to cultivate social-emotional skills in students?							

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Influence Of International Criminal Court Jurisdiction On State Sovereignty In Kenya

Paper ID

IJIFR/V3/ E11/ 048

Page No.

4241-4267

Subject Area

Diplomacy And
International
Relations

Key Words

International Criminal Court, Jurisdiction, State, Sovereignty

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Abstract

The ICC statute pledges that most serious crimes of concern to international community must not go unpunished. The novel mechanism to exert jurisdiction over state parties to the treaty intends to enforce international law to protect human rights. The ICC is a reflection of changing perceptions of how the rule of law relates to larger problems of global inequality. The ICC has been embroiled in criticism that it focuses on criminal cases in Africa and particularly targeting African Leaders. It is further argued that the courts legal prosecutions in African countries could impede political solutions to conflicts and also negate the most sought opportunities for negotiated settlement of disputes hence abrogating the independence of member states in promoting the rule of law on their own as sovereign states.

1. INTRODUCTION

The establishment of the International Criminal Court proclaims that when territorial and national mechanisms fail to secure justice, it is the international community as a whole that must act through a central judicial body, the ICC. The Court is not a substitute for active and efficient national criminal courts. On the contrary, it is intended to constitute a powerful incentive to national courts to institute proceedings against alleged criminals. The ICC only steps in when those national courts prove unwilling Nor unable to act" (Cryer,2002:12). There can be no global justice unless the worst of crimes against humanity are subject to the law. In this age more than ever we recognize that the crime of genocide against one people truly is an assault on us all. The establishment of an International Criminal Court was ensuring that humanity's response was swift (Annan, 2002).

At the global level, during and following World War I, all combatant nations put members of enemy forces on trial for offences against the laws and customs of war. Of special note in the development of international criminal law was Article 227 of the Treaty of Versailles, which authorized the creation of a special tribunal to try Kaiser Wilhelm II. Article 227 reads in part.

"The Allied and Associated Powers publicly arraign William II of Hohenzollern, formerly German Emperor, for a supreme offence against international morality and the sanctity of treaties. A special tribunal was constituted to try the accused, thereby assuring him the guarantees to the right of defense." (Lesaffer, 2012).

While no trial ever took place, this represented a significant departure from the traditional view, still held by many today, that a head of state should be immune from prosecution by any state other than his or her own. All that occurred following World War I where some soldiers were taken for national prosecutions in Germany, with the consent of the Allies, suggesting that the political will of the world's major powers is essential for the enforcement of international humanitarian norms. (Bassiouni, 1998). The Brussels Protocol of 1874 was one of the earliest attempts at drafting a code regulating the conduct of armies in the field. While it made no reference to enforcement or any potential consequences of violations of the agreement, it resulted in a group known as the Institute of International Law drafting the "Manual on the Laws of War on Land" in 1880. This document was to become the model for the conventions adopted at The Hague Peace Conferences of 1899 and 1907. (Green, 1997 : 68). These conventions represented major advances in international law. Most importantly, the Hague Convention IV adopted in 1907, for the first time referred to liability for breaches of international law. While the Convention simply established state obligations, not personal criminal liability, Article 3 of the 1907 Convention seems to exclude any personal liability: "A belligerent party which violates the provisions of the said Regulations shall, if the case demands, be liable to pay compensation. It shall be responsible for all acts committed by persons forming part of its armed forces." The Article 3 provided the first hint of the enforcement of international norms. (Green 1997:72). A state is entrusted by the international community

to manage its own internal affairs, among which the responsibility to protect its citizens from atrocities, the International Criminal Court represents a step towards a system of international law that reaches beyond state sovereignty. It proclaims the interest of humanity in the principle that those who commit the most serious international crimes should be held accountable. It follows from a new scheme that public interests gradually are taking shape and often prevail over private interests (Cassese, 2003).

Each individual State has the responsibility to protect its populations from genocide, war crimes, ethnic cleansing and crimes against humanity. This responsibility entails the prevention of such crimes, including their incitement; through appropriate and necessary means (Rome, 1998). Efforts to suppress armed and sometimes unarmed dissents have in too many cases led to excessive and disproportionate actions by governments, producing in some cases excessive and unwarranted suffering on the part of civilian populations. In a few cases, regimes have launched campaigns of terror on their own populations, sometimes in the name of an ideology; sometimes spurred on by racial, religious or ethnic hatred; and sometimes purely for personal gain or plunder. In other cases they have supported or abetted terror campaigns aimed at other countries which have resulted in major destruction and loss of life. (Kochler, 2001).

In Africa the International criminal Court opened its first case in 2004, after Uganda referred the situation of the Lord's Resistance Army to the court. The process of case initiation was through trigger mechanisms that became complex and politically sensitive. The self-referral of Uganda and the Democratic Republic of Congo in 2004 and that of the Central African Republic in 2005 served as tests of the Court's functioning (Schabas, 2008:563).

In January 2005, pursuant to Security Council Resolution 1564, the International Commission of Inquiry on Darfur, chaired by Antonio Cassese, recommended that the Council refer the case under Article 13 to the ICC on the grounds of gross violation of international humanitarian law (United Nations, 2005:571-572).

The Commission found that, Government forces and militias conducted indiscriminate attacks...on a widespread and systematic basis" amounting to crimes against humanity. Indeed, for the Court to envisage global justice, its relationship with the Security Council must be revised in order to avoid a future situation of "dual justice," as seen in the case of Darfur. However, the Commission did not accuse parties to the conflict of pursuing a policy of genocide, (Ciapi, 2005:591)

Resolution 1593, the case of Darfur became the first situation referred by the Security Council under Article 13 of the Rome Statute, in accordance with Chapter VII of the U.N. Charter. In 2008 and 2009, the prosecutor, submitted an application for an arrest warrant for President Omar Hassan al-Bashir. In 2009 and 2010, the ICC Pre-Trial Chamber I charged Sudan's President with genocide, crimes against humanity, and war crimes). President al-Bashir became the first Head of state indicted by the ICC, discarding official immunity as protection against prosecution (Scheffer, 2002).

On 24 May 2008, Jean-Pierre Bemba, the former Vice-President of the Democratic Republic of the Congo was arrested during a visit to Belgium under a sealed warrant under accusations of war crimes and crimes against humanity committed in CAR. . His confirmation of charges hearing, taking place from 12–15 January 2009, resulted in the charges being confirmed on 15 June 2009. His trial began on 22 November 2010 (ICC information page on Bemba. (Retrieved 18 March 2011)

As a consequence of the 2011 Libyan civil war and its brutal suppression, the UN Security Council voted on 26 February 2011 in Resolution 1970 unanimously to refer the situation in Libya to the ICC. On 23 June 2011, the Prosecutor formally requested the authorization from a Pre-Trial Chamber to begin an investigation into crimes allegedly committed in Côte d'Ivoire. While Côte d'Ivoire is not a state party to the Rome Statute, it has repeatedly and by different administrations accepted the ICC's jurisdiction .On 27 May 2015 in Côte d'Ivoire ,the ICC ruled that it can prosecute Simone Gbagbo can prosecute her on charges including murder and rape linked to violence that left 3,000 people dead in the aftermath of the country's disputed (OTP III, 2011).On 16 January 2013, the Prosecutor determined that there is a reasonable basis to believe that war crimes have been committed in the conflict. Thus, the Prosecutor opened an investigation. (ICC, 2013).

In Rwanda, an adequate institutional response was quite a challenge because the tribunals were ad hoc. In this circumstances more than 11500 people were arrested by the Tutsi government following the Rwanda Genocide but fewer than 50 lawyer were available to "Muster defense" for the accused Due to this shortage of legal experts local dispute mechanism were adopted as special courts called Gacaca where individuals were sentenced to long term imprisonment through communal court system (Uvin, 2003).

In 2003 special court of sierra Leone issued its first indictment for war crimes committed by former rebel leader Foday Sankoh and has military commander Sam Bockarien During 1991-2001 civil war Charles Taylor was also charged for his role in fueling sierra Leon's viscous civil war. Ad hoc criminal tribunals have been active to prosecute violations of international humanitarian law in former Yugoslavia and Rwanda (Bogodan, 2002).

Following (Moreno, 2009) initial announcement of his intention to bring prosecutions against the six suspects, American President Barrack Obama called upon Kenya to co-operate with the ICC.

In a statement he said: "I urge all of Kenya's leaders, and the people whom they serve, to cooperate fully with the ICC investigation and remain focused on implementation of the reform agenda and the future of your nation. Those found responsible was being held accountable for their crimes as individuals. No community should be singled out for shame or held collectively responsible. Let the accused carry their own burdens – and let us keep in mind that under the ICC process they are innocent until proven guilty. As you move forward, Kenyans can count on the United States as a friend" (Obama, 2010). The Kenyan cases were initiated by the processes of assessing the Prosecutor's request for authorization to investigate alleged crimes in Kenya, the ICC judges of Pre-Trial Chamber II requested the Prosecutor to provide clarification and additional information. The judges

requested additional information and clarification with respect to the State and/reorganizational policy under article 7(2) (a) of the Rome Statute and the admissibility within the context of the situation in Kenya, to be provided no later than 3 March 2010.

Prosecutor sought authorization from Pre-Trial Chamber II to commence an investigation of the alleged crimes committed within the context of the 2007-2008 post-election violence. The Prosecutor asserted that the alleged crimes appear to constitute crimes against humanity. On 31 March, 2010, the Pre-Trial Chamber II issued its decision authorizing the Prosecutor to commence his investigations into Kenya. Pre-Trial Chamber II assented to the Prosecutor's request by a two-one majority. The Chamber was mandated to review the conclusion of the Prosecutor by examining the available information, the supporting material as well as the victims' representations in order to determine whether there is "reasonable basis to believe that a crime within the jurisdiction of the Court has been committed or is being committed." (Bulletin, 2010).

In their review the Chamber Judges considered three factors when making their decision: (i) the Court's jurisdiction; (ii) admissibility of the case; and (iii) interests of justice. With regards to the question of jurisdiction, the Judges considered whether the following three conditions were satisfied: firstly, did the alleged crime occur within the period set out in Article 11 of the Statute? Essentially, according to Article 11, the Court only has jurisdiction only with respect to crimes committed after the entry into force of the Statute. Secondly, does the alleged crime fall within the category of crimes under Article 5 of the Statute? According to Article 7 acts that would constitute crimes against humanity include murder, rape and other forms of sexual violence, deportation and forcible transfer of population and other inhumane acts. Thirdly, was the crime committed on the territory of a State Party to the Statute or a national of any such commit the crime? After a careful examination of the available information, the majority of the Chamber October 2010 concurred that the requirements regarding jurisdiction were fulfilled and the request was within the jurisdiction of the Court and a crime against humanity had been committed in Kenya (PTC ii2011).

On 31 March 2011, the Kenyan government challenged the admissibility of the cases before the ICC. It argued that the adoption of Kenya's new constitution and associated legal reforms had opened the way for Kenya to conduct its own prosecutions relating to the post-election violence. On 30 May 2011, the PTC rejected these challenges, arguing that the Kenyan government had yet to begin investigations into any of the cases before the ICC. On 30 August 2011; the ICC Appeals Chamber confirmed the PTC's decision on the admissibility of the cases. (Article 19(2) (b), 2011).

Kenya's government is obliged to cooperate fully with the ICC in investigations and prosecutions of crimes within its jurisdiction. The ICC does not have its own police force and so the cooperation of states is essential to the arrest and surrender of suspects. When a state fails to comply with a request to cooperate, the court may refer the matter to the Assembly of States Parties for further action (ICC article 112 Rome Statute, 2002). The assembly is made up of representatives of all states which are party to the Rome Statute,

and acts as an oversight body for the (ICC Article 112 Rome Statute, 2002). However the intrigues in national and regional and international political circles, alliances in the international arena and theatrics in and out of the ICC ushered an epoch of writing history, a new page in diplomacy and international relations among nation states

2. LITERATURE REVIEW

International criminal law, Africa perspective

The increasingly strained relations between the African Union (AU) and the court led to the head option of list of 'Recommendations by African States Parties to the ICC' in November 2009 which ambitiously grapples with some of the most vexing issues of international criminal justice confronted by the court in its inaugural decade. The strong stand support of the ICC that characterized Africa's earlier position on international criminal justice is less evident today. This change in position tracks broader 'pushback' against the ICC on the continent. It is not possible to identify with clarity or certainty the reasons for this apparent change of heart. The vitriolic attack from within Africa and by scholars associated with Africa, How valid are the attacks on the ICC? And in discussing an ICC that Africa wants, what lessons (if any) might be drawn from the fact that these attacks have been made? The study was to explore the literature, except to note that the Rome Statute is not the only instrument of great inspirational and practical utility that countries are quite prepared to ratify, but which they have failed over many years to take steps to implement or compile reports upon. The very principle of complementarity makes it clear that by domestic prosecutors acting against international criminals, domestic courts ensure the international rule of law through a mutually reinforcing (or complementary) international system of justice. (Cassese, 2002).

The Kenyan cases at the ICC were of significant importance to Kenya, a country once referred to as an island of peace in the sub-Saharan Africa. The adherence to the ICC is therefore a real conundrum. ICC was established by governments, but it is not clearly espoused in any given government's interest. The abstraction of understanding why states would agree to bind their own hands by forswearing certain violent options suggests that under certain circumstances an ICC commitment can contribute to an atmosphere conducive to conflict reduction and peaceful negotiation.

The establishment of the International Criminal Court proclaims that when territorial and national mechanisms fail to secure justice, it is the international community as a whole that must act through a central judicial body, the ICC. The Court is not a substitute for active and efficient national criminal courts. On the contrary, it is intended to constitute a powerful incentive to national courts to institute proceedings against alleged criminals. The ICC only steps in when those national courts prove unwilling or unable to act. (Cryer 2003, :12). The international criminal court is an independent institution that has been established within the bounds of international law as a constitutive of legalization of world politics (Abbot et al., 2000). It originates from state interactions, and leads to the establishment of international institutions and tribunals (Keohane et al., 2000), the

embodiment of which are international organizations. International law is manifested in states 'commitment to agreements and joint decisions reached during interstate interactions. Such interactions need not result into written commitments, hence states' interactions over the years result into customary international law (Barnett and Fennimore, 2004).

However, legalization of world politics implies the establishment of legal frameworks within which states play their political games. For instance, sovereign equality among states is one of the legal principles that dominate world politics (Kirsch, 2003), thereby guiding states in their interactions, the violation of which is considered violation of state sovereignty. Concurrent with sovereignty are the norms of respect for the territorial integrity of states, which engenders the inviolability of territorial sovereignty. Sovereignty has the triple components of territoriality, domestic sovereignty (the idea that states have sovereign control over their domestic spaces without foreign interference), and external sovereignty (which embodies the idea that states treat one another as sovereign equals (Krasner, 2002; Zacher, 2001).

John Gerard Ruggie notes that sovereign equality and respect are reciprocal. States' existence in relation to other states depends on this reciprocity it would be impossible to have a society of sovereign states unless each state, while claiming sovereignty for itself, recognized that every other state had the right to claim and enjoy its own sovereignty" (Ruggie, 1993). Thus reciprocal sovereignty has become the basis of the new international order. Though there may be violations of these sovereignty claims (Krasner, 1993) they remain central to interstate interactions.

Norms like non-interference in domestic affairs, punishments for international crimes (such as war crimes and crimes against humanity), protection and respect for fundamental human rights and freedoms embedded in the United Nations Universal Declarations on Human Rights (UN, 1948), cooperation in the management of shared resources, arms control (such as the 1997 Anti-Land Mines Convention), and respect for treaties reached among different states on different issue-areas, have made international interactions legalized. These interactions constitute interstate politics. International law is rooted in international politics, and ensures the legalization of that politics.

This implies the coexistence and co-constitution of the legal and the political in international affairs. Coexistence implies that both the political and the legal are inseparable in international relations, they are concurrent. Co-constitution here implies that both international law and international relations are bedfellows; politics gives rise to law and law regulates politics. Thus legalization of world politics is apolitical process that defines international relations while politics needs to be played within legal confines; else it is seen as violation of the law. Legalization is done by establishing institutional features characterized by obligation (where states and other international actors are bound by a commitment or a set of commitments); precision [the clear definition of required conduct, and authorization of such conduct]; and delegation (the granting of authority to third

parties “to implement, interpret and apply the rules; to resolve disputes; and (possibly) to make further rules] (Abbot et al., 2000).

This legalization prescribes as well as limits conduct: as states interact they set up rules and behavioral yardsticks from which to judge one another’s behaviour. In the heretofore state, actions are judged as either compliant with or deviant from international law, and relevant sanctions are imposed where applicable. States commit themselves through treaties, conventions and declarations. They set up international institutions, embodied in international organizations which are mandated to implement their decisions (Karns and Mingst, 2010).

Institutions administer justice and resolve disputes; implement joint decisions regarding international cooperation; and monitor states’ compliance with the law. The establishment of “third-party tribunals “to apply general legal principles, resolve transnational disputes and mediate between conflicting parties (Keohane et al., 2000) is central to the institutionalization process.

From the foregoing, international law may be understood to imply not only “legal bureaucratization” or the establishment of institutions for interpreting and administering the law, resolving disputes and enforcing compliance; it also implies the much-upheld legitimacy building by purposively constructing the law “within inherited traditions” from which obligation, precision and delegation derive their relevance (Fennimore and Toohey, 2001).

3. THE CONCEPT ICC AND STATE SOVEREIGNTY

In the 19th century the English jurist John Austin (1790–1859) developed the concept of sovereignty by investigating who exercises sovereignty in the name of the people or of the state; he concluded that sovereignty is vested in a nation’s parliament. A parliament, he argued, is a supreme organ that enacts laws binding upon everybody else but that is not itself bound by the laws and could change these laws at will. This description, however, fitted only a particular system of government, such as the one that prevailed in Great Britain during the 19th century. Austin’s notion of legislative sovereignty did not entirely fit the American situation. The Constitution of the United States, the fundamental law of the federal union, did not endow the national legislature with supreme power but imposed important restrictions upon it. A further complication was added when the Supreme Court of the United States asserted successfully in *Marbury v. Madison* (1803) its right to declare laws unconstitutional through a procedure called judicial review. Although this development did not lead to judicial sovereignty, it seemed to vest the sovereign power in the fundamental document itself, the Constitution. This system of constitutional sovereignty was made more complex by the fact that the authority to propose changes in the Constitution and to approve them was vested not only in Congress but also in states and in special conventions called for that purpose. Thus, it could be argued that sovereignty continued to reside in the states or in the people, who retained all powers not delegated to the United States by the Constitution or expressly prohibited by it under the

terms of the Constitution's Tenth Amendment. Consequently, the claims by advocates of states' rights that states continued to be sovereign were bolstered by the difficulty of finding a sole repository of sovereignty in a complex federal structure; and the concept of dual sovereignty of both the union and the component units found a theoretical basis. Even if the competing theory of popular sovereignty the theory that vested sovereignty in the people of the United States was accepted, it still might be argued that this sovereignty need not be exercised on behalf of the people solely by the national government but could be divided on a functional basis between the federal and state authorities. Another assault from within on the doctrine of state sovereignty was made in the 20th century by those political scientists (e.g., Léon Duguit, Hugo Krabbe, and Harold J. Laski) who developed the theory of pluralistic sovereignty (pluralism) exercised by various political, economic, social, and religious groups that dominate the government of each state. According to this doctrine, sovereignty in each society does not reside in any particular place but shifts constantly from one group (or alliance of groups) to another. The pluralistic theory further contended that the state is but one of many examples of social solidarity and possesses no special authority in comparison to other components of society.

State sovereignty, in its most basic sense, is being redefined not least by the forces of globalization and international cooperation. States are now widely understood to be instruments at the service of their peoples, and not vice versa. At the same time individual sovereignty by which the fundamental freedom of each individual, enshrined in the charter of the UN and subsequent treaties has been enhanced renewed and spreading consciousness of individual rights. When we read the charter today, we are more than ever conscious that its aim is to protect individual human beings, not to protect those who abuse them (Kofi A. Annan, 1999).

(Krasner, 2000) identifies the following four ways in which the term sovereignty is commonly used: Domestic sovereignty, which refers to the organization of political authority within a state and the level of control enjoyed by a state. Inter dependence sovereignty, which is concerned with the question of control, for example, the ability of a state to control movements across its own borders. International legal sovereignty, which is concerned with establishing the status of a political entity in the international system. The state is treated at the international level similarly to the individual at the national level. Westphalia sovereignty, which is understood as an institutional arrangement for organizing political life and is based on two principles, namely territoriality and the exclusion of external factors from domestic structures of authority. Westphalia sovereignty is violated when external factors influence or determine the domestic authority structures. This form of sovereignty can be compromised through intervention as well as through invitation, when a state voluntarily subjects internal authority structures to external constraints. Sovereignty is the most extensive form of jurisdiction under international law. In general terms, it denotes full and unchallengeable power over a piece of territory and all the persons from time to time therein (Holmes, 1988.).

The principle of sovereign equality of states is enshrined in Article 2.1 of the UN Charter. Internally, sovereignty signifies the capacity to make authoritative decisions with regard to the people and resources within the territory of the state. Generally, however, the authority of the state is not regarded as absolute, but constrained and regulated internally by constitutional power sharing arrangements.

A condition of any one state's sovereignty is a corresponding obligation to respect every other state's sovereignty: the norm of non-intervention is enshrined in Article 2.7 of the UN Charter. A sovereign state is empowered in international law to exercise exclusive and total jurisdiction within its territorial borders. Other states have the corresponding duty not to intervene in the internal affairs of a sovereign state. If that duty is violated, the victim state has the further right to defend its territorial integrity and political independence. In the era of decolonization, the sovereign equality of states and the correlative norm of non-intervention received its most emphatic affirmation from the newly independent states (Danner, 2006).

At the same time, while intervention for human protection purposes was extremely rare, during the Cold War years state practice reflected the unwillingness of many countries to give up the use of intervention for political or other purposes as an instrument of policy. Leaders on both sides of the ideological divide intervened in support of friendly against local populations, while also supporting rebel movements and other opposition causes in states to which they were ideologically opposed. None were prepared to rule out a priori the use of force in another country in order to rescue nationals who were trapped and threatened there.

The Westphalia treaties of 1648 established this principle as a cornerstone for international order. (Koskenniemi gental civilizer) The state is entrusted by the international community to manage its own internal affairs, among which the responsibility to protect its citizens from atrocities. African states do have a worry on their sovereignty and state sovereignty has and continues to be placed at the top of their bilateral and multilateral diplomacy, which is a departure from the rest of the international community where the state is viewed as an instrument in the service of its people (Annan 1999). State sovereignty in the African continent is regarded above that of the individuals and this is due to the focus on the apparatus that runs the country and the power that is laid on the sovereign (Samkange 2002).

The African systems of government have subjugated their role to protect the rights of the individuals and instead they are the ones in violation of these rights (Burja 2008). African Union represents the institutionalization of Pan-Africanism. The AU was created to ensure good governance and the rule of law (AU 2000, Preamble). The AU shall defend the sovereignty, territorial integrity and independence of its Member States" (AU 2000, Article 3). The AU's objectives include the promotion of African states sovereignty as well as the promotion of human rights within its member states. The AU has the right to intervene in a Member State pursuant to a decision of the Assembly in respect of grave

circumstances, namely war crimes, genocide and crimes against humanity. (AU 2000, Article 4).

4. OBJECTIVE

The objective of this paper is to assess the Influence of ICC jurisdiction on state sovereignty in Kenya.

5. STATEMENT OF THE PROBLEM

Whereas the international criminal court is viewed as a potential contributor to lasting global peace and stability, the perception that the Court has focused on Africa, and more so, the Prosecutor's choice of cases have been controversial among leaders in the continent and the world at large. Globalization, 'demands that one should radically rethink in politics and take a fresh look at the institutions which act as transmission belts for sentiments and ideals, at the legal systems that are supposed to be an expression of them, and at the jurisprudential conceptions within which these same sentiments and ideals are clothed'. (Ward, 2003).

Majority of African leaders under the auspices of African union joined together to question the moral integrity and legality of the ICC jurisdiction. Some argued that the court is opting for political expediency instead of the universal justice spelled out in the Rome Statute. Others blatantly accused the ICC for targeting Africa. Unfortunately, the ICC is yet to adequately and effectively allay the fears of African leaders and convince them that the court's work is based exclusively on the belief that the most serious crimes of concern to the international community as a whole must not go unpunished and not on political and other unrelated considerations. The international criminal court prosecutions, which targeted the upper echelons of political power, are seen as an extremely sensitive issue in Kenya. These cases have had very powerful socio-political implications on the country's stability and inter-ethnic relations. Analysis of the court's jurisdiction influence on sovereignty of the Kenyan state has not yet been ascertained. It is in this backdrop that this paper investigates the Influence of International criminal court's jurisdiction on state sovereignty in Kenya.

6. FINDINGS

State sovereignty and international criminal justice are in other words two faces of one coin. But they are minted to speak a different language, to different constituencies, and this can lead to conceptual tension. Professor Claus Kress describes how the international law of immunities is in fashion, having been at the heart of two recent judgments of the International Court of Justice, being the subject of two recent resolutions adopted by the Institute de Droit. He discusses two closely related questions in proceedings before the International Criminal Court. The first question is:

Whether international law immunities of States not party to the Statute of the ICC prevent the latter from exercising its jurisdiction over an incumbent Head of State, Head of

Government, Foreign Minister and certain other holders of high-ranking office of such a State?. Only if this first question is answered in the negative does the second question arise, which is whether such international law of immunities precludes the ICC from requesting a State Party to arrest and surrender a suspect who falls into one the above-listed categories and who is sought by an arrest warrant issued by the Court.(Schabas, W. (2010).

Professor Kress points out that both questions are highly relevant insofar as ICC Pre-Trial Chamber I decided on 4 March 2009 that the Court is not prevented by Sudan's immunity under international law from exercising its jurisdiction over the incumbent President of this non-party State, Al Bashir. More than two years later, a differently composed Pre-Trial Chamber I specified in two decisions that the Court is also not precluded from requesting the States Parties of Chad and Malawi to arrest Al Bashir during his visit to their country and to surrender him to the Court. Shortly thereafter, on 9 January 2012, the African Union Commission expressed its serious concern and disagreement with the decisions of the Chamber. Professor Kress acknowledges that at times, the maintenance of the international legal order, on the one hand, and the stability of inter-State relations, on the other hand, may prove to be conflicting goals. Clearly, the international criminal proceedings against Al Bashir adversely affect the stability of the relations of all those States which support those proceedings, with the State of Sudan, as long as Al Bashir stays in power. At the same time, those criminal proceedings aim at the maintenance and at the strengthening of the *noyoudur* of the international legal order (Kuwali, D. (2011).

During the focus discussion group one member concluded that;

International criminal law in the strict sense comes at a price with respect to the stability of inter-State relations", but that "this price is worth paying, provided that the scope of application of substantive international criminal law strictly will not be diluted, but remains confined to the conduct that constitutes a fundamental assault to the nature of the international legal order. (Discussant).

In view of the above, the conduct of states is regulated by international systems and norms for which the states themselves have voluntarily adhered to substantively and procedurally in fact and in law and that universal jurisdiction is applied, or claimed to be applied, by a state where the most serious crime is committed and when there is no connection of interests ('link point') between the forum state and place of crime, nationality or residence of the suspect or the victims or national interest.

However when considering and applying the theory of realism, the international community in fact does not have a common understanding of when 'universal jurisdiction' is applicable, the most obvious evidence of which is that there exist two forms of universal jurisdiction: 'relative universal jurisdiction' and 'absolute universal jurisdiction'. The former requires that the suspect is found within the territory of the forum state in order for universal jurisdiction to be exercised, so it requires some connection, namely the location where the suspect is found. The latter does not require any connection. Clearly, there is a

significant difference between the conditions of applicability of these two forms of ‘universal jurisdiction’ and the target to which it may be applied. (Murungu, C., & Biegon, J. (2011). Thus a pertinent question as to whether: Universal jurisdiction ‘can actually be without limits? in this context an Interviewee retorted that as long as states exist and are recognized in International law, the question of limitations in universal jurisdiction does not arise because being universal states are guided also universally (key informant).

The study has established that international law is applicable to a limitless jurisdiction and this is an absolute form of universal jurisdiction (‘universal jurisdiction in absentia’) that is free of conditions such as link points. However the establishment of universal jurisdiction should be limited to situations clearly allowed by international law, and should also be limited by international law. In essence absolute universal jurisdiction is permissible, in international law, and should be exercised only over prescribed crimes such as terrorism and piracy, and should not be universally exercised over other crimes in all accounts the study overly contends that there is a very strong relationship between ICC jurisdiction and state sovereignty.

Table 1: International Criminal Court Jurisdiction includes national jurisdiction

Response	Percentage
Yes	81.29%
No	12.28%
Neutral	6.43%
TOTAL	100%

Source: Data, Researcher 2016

The above table illustrates that 81.29% of the respondents agreed that the ICC jurisdiction includes national jurisdiction a paltry 12.28% did not agree and a negligible 6.63% neither agreed nor disagreed with the statement the in fact during the interview process one respondent retorted

We (government) signed and ratified the Rome statute, the act that created the ICC at the Hague why are we whining over this clear matter he paused, In fact our parliamentarians said “don’t be vague let’s go to Hague (key informant). From the above it can be deduced that the international criminal jurisdiction and national criminal jurisdictions are in tandem yet according to principles of sovereignty in international law, a nation has jurisdiction over crimes committed within its territory, which refers to ‘the principle of territory’. Besides this, under certain circumstances, a nation also has jurisdiction based on the nationality of the suspect (‘positive principle of territory’), the nationality of the victim (‘negative principle of territory’) or the nation’s security or other important interests (‘protective principle of territory’). Whereas that the sovereignty of each nation is equal, every nation may decide to exercise jurisdiction based on the principles of territory or the individual or national interests.

Therefore under these circumstances, any nation who exercises its jurisdiction purely out of its own will, regardless of the opinions and propositions of other nations, may offend the sovereignty of other nations. This is in breach of the principle of equality of sovereign nations, and may cause conflicts between nations. The assertion that ICC jurisdiction and

national criminal jurisdictions are congruent is to emphasis on the whole idea of establishing an international criminal court was based on an ideal of justice, on the conviction that when faced with heinous crimes that affect the international community, impunity is unacceptable. Now if all national criminal jurisdictions were effective, efficient and just, as well as able to deal with such crimes, no international court would be necessary. National courts are responsible for the prosecution of those perpetrators not prosecuted by the ICC. The ICC investigates and prosecutes only if states or national courts are unable or unwilling to do so. Kenyan authorities have an obligation under international law to provide effective remedies to victims of serious violations of human rights committed in the 2007-8 post-election violence; and reparation when crimes were committed by state agents or when the State failed to prevent certain crimes committed by private citizens. When the Kenyan Government challenged the admissibility of the Kenyan cases before the ICC, the Pre-Trial Chamber ruled that there was no “concrete evidence of on-going proceedings before national judges” against the accused. To date only few alleged perpetrators were brought to justice before Kenyan courts. The Kenyan Office of the Director of Public Prosecutions has reportedly initiated new investigations into at least 6,000 cases involving alleged low and mid-level perpetrators. A task force to review those cases was set up in February 2012. However, in August 2012, the task force concluded that most PEV cases were unsuitable for prosecution due to a lack of evidence. A discussant in focus discussion group on the above was very categorical and in-depth as one member of the group earmarked Kenya government at that time failed to arrest and prosecutes the perpetrators of international crimes, committed during the 2007-2008 post-election violence. How can the purported criminals of yesteryears, now the government of today, convict themselves by submitting to ICC what is deemed to be evidence of finality? This argument ignites and is a microcosm of the study. It is endeared in constructivism theory as Michael Barnett articulates constructivist international relations theories as being concerned with how ideas define international structure, how this structure defines the interests and identities of states and how states and non-state actors reproduce this structure. (Sikkink, K., 2011).

The key tenet of constructivism is the belief that "International politics is shaped by persuasive ideas, collective values, culture, and social identities Constructivism argues that international reality is socially constructed by cognitive structures which give meaning to the material world. States, like people, are insecure in proportion to the extent of their freedom. If freedom is wanted, insecurity must be accepted. Organizations that establish relations of authority and control may increase security as they decrease freedom. If might does not make right, whether among people or states, then some institution or agency has intervened to lift them out of nature's realm. The more influential the agency, the stronger the desire to control it becomes. In contrast, units in an anarchic order act for their own sakes and not for the sake of preserving an organization and furthering their fortunes within it. Force is used for one's own interest. In the absence of organization, people or states are free to leave one another alone. Even when they do not

do so, they are better able, in the absence of the politics of the organization, to concentrate on the politics of the problem and to aim for a minimum agreement that will permit their separate existence rather than a maximum agreement for the sake of maintaining unity. If might decides, then bloody struggles over right can more easily be avoided. (Walt, 1998) This was well orchestrated by shuttle diplomacy by Kenya government officials to the united nation as and also to the assembly of state parties at the African union summit in Addis Ababa.

Table 2: International criminal Court Jurisdiction is a transformation of states treaty obligations.

Response	Percentage
Yes	70.18%
No	22.81%
Neutral	7.02%
TOTAL	100%

Source: Data, Researcher (2016)

70.18% of the respondents agreed that international criminal court jurisdiction is a transformation of states treaty obligations the concept of state responsibility in this context refers to the responsibility of sovereign states to deliver a range of political goods and services to its citizens. Rothberg has identified a bundle of the most crucial political goods, roughly rank ordered, that establishes a set of criteria according to which states may be judged strong, weak, or failed (Kirsch, Philippe, and John T. Holmes, 2006)

The state's most important function is the provision of security. This means creating a safe and secure environment and developing legitimate and effective security institutions. In particular, the state is required to prevent cross border invasions and loss of territory; to eliminate domestic threats or attacks on the national order; to prevent crime; and to enable its citizens to resolve their disputes with the state and their fellow citizens. Another major political good is to address the need to create legitimate effective political and administrative institutions and participatory processes and ensuring the active and open participation of civil society in the formulation of the state's government and policies. (Jackson, R. H. 1990).

Other political goods supplied by states include medical and health care, schools and educational instruction, roads, railways, harbours and other physical infrastructure, money and banking system, a beneficial fiscal and institutional context in which citizens can pursue personal entrepreneurial goals, and methods of regulating the sharing of the environmental concerns (Lattanzi, Flavia, 1996).

However, these responsibilities should be seen within the broader context of the global human rights norms. The Charter of the United Nations is the embodiment of the international political and moral code and Article IX calls for the promotion of higher standards of living, conditions of economic and social progress and development, and respect for human rights and fundamental freedoms which encapsulates the international consensus and articulates best-practice international behavior.

The Universal Declaration of Human Rights was the first international pronouncement of the human rights norm and places freedom, justice and peace in the world in the Inherent dignity and equal and inalienable rights of all humans. The subsequent International Covenant on Economic, Social and Cultural Rights and the International Covenant on Civil and Political Rights further enhanced the ideal of free human beings enjoying civil and political freedom. The June 2000 Ministerial Conference on “A Community of Democracies” and a non-governmental conference on “World Forum on Democracy” reaffirmed the developing and developed countries' commitment to common democratic values and standards. It is these Charters, Covenants and other International Treaties that establishes the foundation for a state's responsibilities to its citizens. (Newman, E. (2004).

7.1 International Law Commission's (ILC), Approach to state treaty obligations

The Commission proposed three options to the General Assembly: (1) an international criminal court with exclusive jurisdiction, according to which individual States should refrain from exercising jurisdiction over crimes falling within the competence of the Court; (2) concurrent jurisdiction of the international criminal court and domestic courts; and (3) an international criminal court having only review competence that allowed it to examine decisions of domestic courts on international crimes. (Venkata Rao, 2001).

The Commission saw some disadvantages in the second alternative, considering it contrary to uniformity of application. It also viewed as problematic the potential situation in which one party wished to initiate an action before a domestic court and another party wanted it brought before the international court. However, Special Rapporteur Thiam who had prepared an earlier draft statute for the international criminal court and the Commission deemed the possibility of having concurrent jurisdiction to be satisfactory and a good compromise. In fact, without expressly referring to the concept of complementary jurisdiction, the Commission indicated that in those cases where both domestic and international jurisdiction concur, preference would be given to domestic courts and the international court would have jurisdiction only if the competent States decide not to-investigate.(William A. Sachabas,2001)

This solution was not uncontroversial within the Commission, especially for those who saw it as a source of conflicts of jurisdiction that may lead to paralysis and injustice. Some members therefore supported the idea of the ICC having exclusive jurisdiction, which would eliminate possible conflicts of jurisdiction between it and domestic courts. In this context it is important to note that some members of the Commission emphasized that the principle of sovereignty was no longer considered to be an absolute principle as in classic international law (Arsanjani, Mahnoush H., 1999)

The Commission following a proposal made by the Special Rapporteur also proposed a fusion of options (1) and (2),according to the types of crimes to be investigated: for certain crimes the Court would have exclusive jurisdiction and for others concurrent jurisdiction. The problem with this proposal was to compile the list of crimes which would fall under each type of jurisdiction and on which views differ sharply. The third option the Court having powers of judicial review also had some supporters, who argued that this solution

dealt with the uniformity problem raised by those in favour of exclusive jurisdiction. In their opinion this alternative “would also Performa preventive role in that it would be an incentive to national courts to be more careful and watchful in applying the norms of international law”, and could be acceptable to States if similar systems in all existing complaints procedures in international human rights law were taken into account. However, it was finally ruled out as an unrealistic option (Lattanzi, Flavia, 1996).

7.2 Complementarily principle espoused in state treaty obligations.

Complementarily principle is to be found in many different forms throughout the Court’s procedure, and even in the investigation phase to be carried out by the Prosecutor. First of all, the introduction to the complementary character of the Court was spelled out and emphasized in the Preamble, Emphasizing that the International Criminal Court established under this Statute shall be complementary to national jurisdictions. This statement is supplemented by the preceding paragraphs, which establish the grounds for complementarily and the manner in which it should be understood: international crimes shock the conscience of humanity, threaten the peace, security and wellbeing of the world, and should not go unpunished; States have the main responsibility for taking the required measures to avoid impunity; and an international criminal court is needed, for the sake of present and future generations, to guard them against the most serious crimes of concern to the international community as a whole.(Robert Jackson, 1999)

The above assertions were emphasized during a focus discussion group where a participant remarked that the constitution of Kenya 2010 has domesticated the Rome statute and in the foregoing the Kenyan leadership and the populace at large are obligated to the ICC jurisdiction

The Rome Statute contains in Article 1 explains the essence of establishing the Court’s jurisdiction: An international Court is hereby established. It shall be a permanent institution and shall have the power to exercise its jurisdiction over persons for the most serious crimes of international concern, as referred to in this Statute, and shall be complementary to national criminal jurisdictions” (Rome statute 2002).

The study found out that the international criminal court as a creature of the Rome statute has the prerequisites to the exercise of jurisdiction, however, this depend greatly on the willingness of all states parties concerned in the prosecution to cooperate with the Court. The Statute of the ICC in this context has been examined from the viewpoint of treaty law, qua a multilateral international treaty substantively and procedurally to be effective the ICC depends not only on widespread ratification of the Rome Statute, but also on states parties complying fully with their treaty obligations. For almost every state this will require some change to national law. Of course the degree to which new law will be necessary to implement a state party’s Rome Statute obligations will depend on its existing laws and legal system. Given the necessity for implementing law, there has been a concerted effort, at the national, sub-regional and regional levels to ensure that effective implementing law is made by all ratifying states

Human Rights Watch (2011) considers the adoption of the Rome Statute to have been a watershed in the development of an effective international criminal justice system in which there are no safe havens for those who commit the worst international crimes. The drafters of the Rome Statute had high expectations that the ICC will “put an end to impunity for the perpetrators of [these crimes] and contribute to [their] prevention”.

However, Human Rights Watch believes that it is equally important that states parties make their ratification meaningful through effective national implementing law that enables them to meet their principal obligation under the Rome Statute, namely cooperating with and assisting the ICC. It is presumed that all states parties will need to modify their national law in some way to meet this obligation. The full cooperation of states parties is needed for the ICC to function effectively. States parties will be relied on to assist the ICC at every stage of its investigations and prosecutions. The ICC will not have its own police force or prisons so states will be required, on behalf of the ICC, to arrest and surrender suspects, interview witnesses, provide information and evidence to the ICC, agree to take persons sentenced to prison for the term of their imprisonment and provide any other assistance sought by the ICC. For this reason it is crucial that states parties have national laws and procedures in place to ensure that they can fully and expeditiously meet requests for cooperation and assistance from the ICC.

The ICC is only one, albeit an important, component of an effective international criminal justice system. National criminal justice systems remain the primary component. The Rome Statute intended the ICC to step in and prosecute international crimes of greatest concern to the international community when states are unable or unwilling to prosecute. The regime in the Rome Statute reflects this intention. Therefore, an international criminal justice system needs states to pursue those who commit genocide, war crimes and crimes against humanity in order to be effective. For this reason, states need to incorporate into national law those ICC crimes that are not already on their statute books. This will enable them to prosecute the international crimes themselves, strengthening their national criminal judicial systems and contributing to the establishment of an effective international criminal justice regime.

In many countries international treaties need to be incorporated into domestic law by specific implementing legislation (dualist countries). However, in other states, referred to as “monist”, the mere ratification of an international treaty is sufficient for the treaty to be part of the law of the land. Many civil law countries are monist, while those countries with a common law tradition tend to be dualist. Typically, the constitutions of monist states provide that international treaties that are binding on the state have constitutional status and take precedence over ordinary laws in the hierarchy of national norms. For this reason, it is often argued that these countries do not need to implement treaties as they are already part of national law. However, as the Rome Statute has the potential to impact on a wide range of national laws, including constitutional provisions and criminal substantive and procedural law, relying solely on automatic incorporation into national law may not

be sufficient to meet the Rome Statute treaty obligations. Specific national laws, especially relating to substantive and procedural criminal law, should be enacted.

Because of the importance of the Rome Statute and the reliance of the ICC on the timely cooperation of states parties, Human Rights Watch urges “monist” states to make an exception for the Rome Statute. By implementing the Rome Statute into national law, they will ensure that the relevant authorities are able to cooperate fully with the ICC, that the offences against the administration of justice by the ICC are punishable under law in national courts and that the ICC crimes can be prosecuted in national courts. It is in light of the above argumentations that the study explores a strong relationship between ICC jurisdiction and state sovereignty through state treaty obligations.

Table 3: International Criminal Court Jurisdiction pre-empts the jurisprudence of Sovereignty.

Response	Percentage
Yes	60.23%
No	29.82%
Neutral	9.94%
Total	100%

Source: Data, Researcher 2016

60.23% of the respondents agreed that ICC jurisdiction pre-empts the jurisprudence of state sovereignty while 29.82% disagreed with the same and 9.94 declined to comment the findings of the study are clearly expressing the Preamble of the Rome Statute of the International Criminal Court ‘and article 1 that refer to the International Criminal Court (ICC) as an international institution that "shall be complementary to national criminal jurisdiction. This complementary relationship between the ICC and national criminal jurisdictions means that, as opposed to the two Adhoc Tribunals. The International Criminal Tribunal for the Former Yugoslavia (ICTY) and the International Criminal Tribunal for Rwanda (ICTR) the ICC does not have primary jurisdiction over national authorities," but plays a subsidiary role and supplements the domestic investigation and prosecution of the most serious crimes of international concern,(Mil. L. Rev. (2001),The Court is only meant to act when domestic authorities fail to take the necessary steps in the investigation and prosecution of crimes enumerated under Article 5 of the Statute. The Statute does not explicitly use or define the term “complementarity” as such; however, the term has been adopted by many negotiators of the Statute, and later on by commentators to refer to the entirety of norms governing the complementary relationship between the ICC and national jurisdictions, (Triffterer, O. (2008).

Article 17 establishes the substantive rules that constitute the principle of complementarity. The Statute defines the question of complementarity appertaining to the admissibility of a case rather than to the jurisdiction of the Court. As is the case with other international judicial institutions, such as the ICJ or human rights courts, the issues of admissibility and jurisdiction in the sense of competence in the pending case have to be distinguished, even though both concepts are closely related. (Cf. G. Fitzmaurice,

1986)The Court cannot exercise the jurisdiction that it has if a case is inadmissible. Thus, the principle of complementarity does not affect the existence of jurisdiction of the Court as such, but regulates when this jurisdiction may be exercised by the Courts (J. Crawford, 2003).

Seen like this, the heading of article 12 of the Statute is strictly speaking a misnomer, since it does not concern the exercise of jurisdiction, but the existence of it, Article 17 thus functions as a barrier to the exercise of jurisdiction. The Rule of Procedure and Evidence of the ICC recognize this by providing that the Court shall rule on any challenge to its jurisdiction first before dealing with matters of admissibility complementarity as discussed in the above, forms the legal anatomy of ICC jurisdiction and state sovereignty. In concurring with the above, during the interview session one interviewee reiterated: The historiography of ICC holds the sanctity of statehood as enshrine in the principle of sovereignty by compounding sovereignty with responsibility in states .this has opened a new chapter in the approach of international criminal law and international relations. (Key informant).

The Statute establishing the ICC is an international, multilateral treaty. According to article 31 of the Vienna Convention on the Law of Treaties, provisions of a treaty shall be interpreted, inter alia, with regard to its object and purpose. In order to understand the principle of complementarity and to facilitate and structure the interpretation of the different provisions that define the concept substantively and procedurally, it seems pertinent to enquire about the rationale of complete complementarity. The most apparent underlying interest that the complementarity regime of the Court is designed to protect and serve is the sovereignty both of State parties and third states (Nord. J. Int'l L. 69 (2000), under general international law, states have the right to exercise criminal jurisdiction over acts within their jurisdiction.

The exercise of criminal jurisdiction can indeed be said to be a central aspect of sovereignty itself(Brownlie, 1998)whereas it is the right of states to exercise criminal jurisdiction over crimes contained in the Statute, the preamble of the Rome statute refers to the duty of every state not limited to States parties to exercise its criminal jurisdiction over those responsible for international crimes A purpose of the complementarity principle may thus be to ensure that states abide by that duty, either by prosecuting the alleged perpetrators themselves, or by providing for an international prosecution in case of their failure to do so. The declaratory wording of the Preamble may suggest that this duty precedes the coming into force of the Statute ("recalling that it is the duty").(D.Sarooshi, (1999),While such a duty unquestionably exists with regard to some international crimes. it is questionable whether it covers all crimes in their different facets under the Statute, especially as regards crimes against humanity." Be that as it may, it is clear that the principle of complementarity was designed to allow for the prosecution of such crimes at the international level where national systems are not doing what is necessary to avoid impunity and to deter a future commission of crimes. Moreover, and independent from the existence of a duty to prosecute, the complementarity regime is surely designed to

encourage states to exercise their jurisdiction and thus make the system of international criminal law enforcement more effective.

The interest of the international community in the effective prosecution of international crimes and the endeavour to put an end to impunity, the deterrence of the future commission of such crimes is a practical engagement among states and state parties. The primary concern of the Statute, and specifically the complementarity principle, is thus to strike an adequate balance between this interest and state sovereignty however states from the global south frequently complain of skewed power relations. Among the questions addressed are whether the ICC is guilty of selective prosecution of cases originating in Africa, why the AU is so critical of the ICC and how its attitude has evolved over the years and how the ICC constrained by the customary international law doctrine of head of-state immunity. In 2008, the AU reacted to the increased use of universal jurisdiction in European states by adopting a resolution denouncing certain Western governments and courts for abusing the doctrine of universal jurisdiction and urging states not to cooperate with any Western government that issued warrants of arrest against African officials and personalities in its name. The watershed moment for the AU's relationship with the ICC came in March 2009, following the issuance of the first arrest warrant for President Omar al Bashir of Sudan (Human Rights Watch (2010).

For states parties to the Rome Statute, this transformed it from a 'paper commitment' with no real consequences into a very real commitment with potentially serious consequences. An interviewee retorted: The issuance of warrants of arrest against Al Bashir is a pronouncement by the ICC that it is not business as usual, leaders must be warned, gone are the days of arbitrary rule, abuse of power and impunity. This is an era of sovereignty and responsibility among states.

The Bashir arrest warrant caused the relationship between the ICC and the AU to deteriorate for two reasons. First, members of the AU felt that the issuance of the arrest warrant was an impediment to the organization's regional efforts to foster peace and reconciliation processes in Sudan, and that the ICC failed to appreciate the effect that its actions were having on these efforts. Secondly, diplomatic umbrage was taken over the indictment of a sitting head of state, which sparked a debate over whether the Rome Statute can legitimately extinguish diplomatic immunity in states that are not parties to it, such as Sudan. The AU's opposition to the ICC has created a legal conflict for states that are parties to both institutions; different governments have chosen to resolve it in different ways. For instance, when President Jacob Zuma was due to be inaugurated in South Africa, invitations were sent out to all African heads of state, including President Bashir. As a party to the Rome Statute, South Africa would be required to arrest President Bashir, if he attended the event. Overnight this created a diplomatic scandal that was very difficult for South Africa to deal with.

After two or three days' silence from the South African government on the issue, civil society representatives threatened to request declaratory relief from a court that if President Bashir were to arrive in South Africa there would be an arrest warrant issued for him. The government eventually took the position that it would be under an obligation to arrest Bashir if he arrived in South Africa, and the Sudanese president did not attend the inauguration. South Africa's position that it is bound by the Rome Statute has been clear and consistent since then. But it is likely that many other African states faced with a similar choice would side with the AU, not the ICC.

In October 2011, when Binguwa Mutharika was Malawi's president, Bashir attended a for the Common Market for Eastern and Southern African States summit in that country. Malawi issued a formal memorandum in support of its decision to host Bashir, in which it relied on (i) the AU's resolution, passed in response to President Bashir's arrest warrant, urging states not to cooperate with the ICC, (ii) the customary international law doctrine of head-of-state immunity and (iii) the fact that Sudan was not a party to the Rome Statute and could therefore not be bound by its suspension of immunity, to demonstrate that it was not under obligation to arrest him. Decision Pursuant to Article 87(7) of the Rome Statute on the Failure by the Republic of Malawi to Comply with the Cooperation Requests Issued by the Court with Respect to the Arrest and Surrender of Omar Hassan Ahmad Al Bashir, However, in June 2012 the current President of Malawi, Joyce Banda, refused to allow Bashir to attend an AU meeting in Malawi, forcing the organizers to move the meeting just three weeks before it was before it was scheduled. In 2011, the National Transitional Council (NTC) in Libya allowed Bashir to visit Tripoli but, surprisingly, NATO states made no attempts to intervene in the matter. Indeed, Bashir was the first foreign head of state to visit the NTC in Libya after the fall of the Gaddafi regime, as the Sudanese president provided assistance to the rebels in Benghazi as 'payback' for Gaddafi's assistance to rebels in Sudan's Darfur region. The fact that Libya is not a party to the Rome Statute partly explains the NTC's failure to arrest Bashir, but it does not explain why NATO member states like the United States and the United Kingdom who undoubtedly had a moral responsibility to do something failed to intervene.

Under customary international law senior state officials, such as President Bashir, for whom arrest warrants, were issued in 2009 and 2010, and President Kenyatta and his deputy William Ruto, whose trials began in 2013, have immunity from legal proceedings. There is a question as to the how the ICC is constrained by the immunity of sitting head of state and to what extent should peace be tampered with justice? The question of immunities is central to the AU. The interpretation of Article 27 of the Rome Statute, assumes that state immunity does not apply under the statute, this creates an exception to customary international law and allows heads of state and other senior state officials to be tried under the ICC jurisdiction.

Article 98 of the Rome Statute appears to conflict with Article 27, however, by providing that the ICC may not request cooperation or surrender from a state where that would require that state to act inconsistently with its obligations under international law with

respect to the state or diplomatic immunity of a person or property of a third state, unless the court can first obtain the cooperation of that third state for the waiver of the immunity. But there appears to be an acceptance that states parties, by virtue of becoming members of the Rome Statute, have waived the immunity of their own officials or have otherwise accepted that they do not have immunity. So, at least as far as states parties are concerned, Article 98 does not apply, and there is no immunity before the court.

The difficulty arises in respect of states that are not parties to the Rome Statute, such as Sudan. There are a variety of views on this issue. It has been argued that in this situation, it is irrelevant that Sudan is not a state party because the case was referred by a Security Council resolution, which is binding on all UN member states. In 2012 the AU Assembly asked the AU Commission to consider whether it would be possible to request an advisory opinion from the International Court of Justice (ICJ) on the question of immunity. The question of immunity raises important, unresolved questions. Are the cases against President Kenyatta and Deputy President Ruto so sensitive throughout Africa as to pose a real challenge to the court's authority? In May 2013, the Kenyan government successfully lobbied AU members to adopt a resolution calling for the cases to be referred to Kenya for national proceedings to be taken, rather than being left to the ICC. The resolution was supported by all states except Botswana.

The resolution regrets that the AU request to the Security Council to use its powers under Article 16 of the Rome Statute to seek a deferral of the Bashir case was not acted upon. It reaffirms that country such as Chad, which previously welcomed Bashir, did so in conformity with the decision of the AU Assembly and therefore should not be penalized. It also stresses the need for international justice to be conducted in a transparent and fair manner in order to avoid any perception of double standards, and 'expresses concern at the threat that the indictment(s) may pose to the on-going efforts in the promotion of peace, national healing and reconciliation, as well as the rule of law and stability, not only in Kenya, but also in the Region'. And, finally, the resolution 12 In order to do this, it would be necessary to petition States through UN General Assembly (GA) to file the request because the AU has no standing before the ICJ. An alternative currently being mooted in social media is whether the Assembly of State Parties, via the GA, could request an advisory opinion from the ICJ.¹³ Decision on International Jurisdiction, Justice and the International Criminal court (ICC).

Article 16 of the Rome Statute provides that 'No investigation or prosecution may be commenced or proceeded with under this Statute for a period of 12 months after the Security Council, in resolution adopted under Chapter VII of the Charter of the United Nations, has requested the Court to that effect; that request may be renewed by the Council under the same conditions.'www.chathamhouse.org.

Africa and the International Criminal Court requests a referral (presumably by the Security Council) of the cases back Kenya in order for its reformed judiciary to deal with

these matters. Four points are noteworthy about the AU's resolution. First, nowhere does it mention the victims of the violence or the citizens of the affected states. Second, the AU appears to have moved on from the Sudan issue, and is now focused almost entirely on Kenya. Nothing, except Kenya's persistent lobbying, adequately explains why Kenyatta's and Ruto's cases have proved more galvanizing than Bashir's. In further evidence of Kenya's effective lobbying campaign, the Kenyan government managed to put the issue on the AU's agenda just five days before the session, despite the agenda having been drawn up well in advance.

Third, the claim that the judiciary is reformed is one with which many Kenyan human rights and criminal justice experts disagree. A group of these experts has written to the UN secretary-general stating that there is no process of reconciliation, no mechanism to try these cases in Kenya and the threat of instability in the region is hollow.

Fourth, there was an attempt to move the AU members to withdraw from their treaty obligations under the Rome Statute, though from the text of the resolution it appears that the attempt has failed for now. It is not clear that there is any legal basis for the AU to require its members to withdraw from their treaty obligations that were entered into voluntarily and on an individual basis. The resolution ends by asking the AU Commission to organize a brainstorming session as part of the 50 Anniversary discussion on the broad areas of International Criminal Justice System, Peace, Justice and Reconciliation as well as the impact/actions of the ICC in Africa, in order not only to inform the ICC process, but also to seek ways of strengthening African mechanisms to deal with African challenges and problems.

Although parts of the Kenyan government appear to have been lobbying hard against the ICC, there is an apparent lack of coordination within it on this issue. While Deputy President Ruto was in The Hague at a status hearing of the ICC, the Kenyan permanent representative at the UN submitted a letter to the Security Council, apparently on behalf of the government, requesting it to instruct the ICC to discontinue these cases. This was just days before the ICC prosecutor was due to address the Security Council. It is claimed that Ruto was not informed of the letter in advance and subsequently issued a letter to that effect and re-committing himself to cooperation with the ICC's legal process.

Efforts by the government to block the trials from going ahead, or effect their referral back to Kenya, were unlikely to be successful; decisions on complementarity are for the ICC alone and the fact that Kenya has not put in place the necessary legal framework to try these cases properly give the lie to the claim that the cases ought to be referred back to it. But despite the apparent futility of Kenya's campaign as it relates to Kenyatta and Ruto and Sang, it may be that in the long run, the cases may lead to the irretrievable breakdown of the relationship between the AU and the ICC. In view of the above, the research Paper established that the jurisprudence of sovereignty is ingrained in state practice and more so in recognition of international systems and norms such as the ICC.

7. CONCLUSION

The study concluded that, ICC Jurisdiction is typically understood in relation to territory or nationality. This conceptualization complements a global order of separate sovereign states, each enjoying the power to judge within its territory and to create law for its citizens.

In Kenya, the perpetrators of crimes against humanity, the modern enemy of all mankind claimed to act in the name of the National Interests and within the national jurisdiction i.e. the use of custodial forces, the executive order and even political innuendos used by the government of the day. By contrast, the trials involving the Kenyans at the Hague entailed the ability to judge offenders who had no connection to the state as an entity.

Sitting in judgment at the Hague cases were about individuals not the Kenyan state. Decoupled from territory and nationality, the exercise of universal jurisdiction raises the question of whether it undermines a global order of sovereign states by allowing some state to reach into the affairs of another under the auspices of international criminal regime such as the ICC. This question is underscored by the crimes that, in the twentieth century, were found to give rise to universal jurisdiction, such as crimes against humanity that, in one common formulation, “shock the conscience” of mankind. Indeed in view of the above, Kenya's sovereignty was ceded to some extent when the Head of state and his deputy were indicted of international crimes namely crimes against humanity.

On one level, using international law to build the will and capacity of states to act domestically offers great opportunities to enhance the effectiveness of the international legal system. National governments will have new incentives to act. Domestic institutions will grow stronger, and can be harnessed in pursuit of international objectives. States can thus respond to transnational threats more effectively and efficiently. Yet each of the new functions of the international system suggested here backstopping, strengthening, and compelling is a double-edged sword.

Backstopping national institutions can be counterproductive to degree states may defer to an international forum as a less politically and financially costly alternative to national action.⁸⁴ Well-intentioned efforts to help, often through NGOs as well as international institutions; can end up weakening local government actors by siphoning off both funds and personnel. The process of strengthening domestic institutions, if not properly designed and implemented, can also squeeze out local domestic capacity.

Finally, and most dangerously, by compelling national action, the international legal system may undermine local democratic processes and prevent domestic experimentation with alternate approaches. The most Significant danger inherent in these new functions of international law, however, lies in the potential of national governments to co-opt the force of international law to serve their own objectives. One of the modern limits to Westphalia concepts of sovereignty is the obligations imposed by international law particularly human rights law on the conduct of states toward their own citizens. Yet, by strengthening state capacity, international law may actually make states more effective at the very repression and abuse that interference challenge seeks to overcome. Similarly,

by compelling state action, international law may give national governments new license to undertake major reform agenda as is in Kenya in the Judiciary, police service and Elections reforms.

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A Formation On-Cancellation Of Current Harmonics In Three Phase Four Wire System Using Smart Filter

Paper ID

IJIFR/V3/ E11/ 045

Page No.

4268-4275

Subject Area

Electrical Engineering

KeyWords

PI Controllers, Fuzzy, Sensible Filter Exploitation, MATLAB/ SIMULINK

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Abstract

The new management topology for reduction of current harmonics in 3 part Four wire distribution system was conferred during this thesis .Starting with incandescent lightweight bulb each load these days creates harmonics. the problem of harmonics is of nice concern to engineers, building designers and additionally in industrial applications as a result of they are doing not simply distort voltage waveforms, however they'll additionally overheat the building wiring, overheat electrical device units, and cause end-user instrumentation failures. Thus, giving attention towards power quality has become necessary these days .The main objective of this project is to review and style sensible filter exploitation combination of fuzzy and PI controllers. In sensible filter solely used single-phase inductances and capacitors, while not exploitation any electrical device or special magnetism device. The simulation results supported MATLAB/ SIMULINK were performed to verify the effectiveness of sensible filter. This filter reduced current harmonics over previous ways of reducing current harmonics.

1. INTRODUCTION

Current harmonics in distribution grids largely result from the widespread usage of nonlinear masses. Discharge lamps and power-electronics-based equipment's area unit 2 request samples of nonlinear masses in residential, commercial, and industrial facilities. Currents harmonics even have a major result on medium-voltage (MV) and 55 networks.

Harmonics area unit number multiple of elementary frequency(i.e. fifty or sixty Hz) element that more along resulted in distorted wave. maybe second harmonic is 2 time of elementary (i.e. one hundred or one hundred twenty Hz), equally for third harmonic it's thrice of the elemental element (i.e. a hundred and fifty or one hundred eighty Hz) then on. Thanks to extreme use of power converters and alternative non-linear masses in business it's ascertained that it deteriorates the facility systems voltage and current waveforms. Static power converters admire single

phase and 3 section rectifiers, thermal resistor converters and huge variety of power equipment area unit nonlinear masses that generate appreciable disturbances within the ac mains. primarily voltage harmonics and power distribution issues arise thanks to current harmonics made by nonlinear masses. As nonlinear currents ow through electrical system and therefore the distribution-transmission lines, extra voltage distortion manufacture thanks to the resistivity related to the electrical network. The presence of harmonics within the power grid cause bigger power loss in distribution, interference downside in communication system and, typically end in operation failure of electronic equipment's that area unit additional and additional sensitive as a result of it contains electronics controller systems that work with terribly low energy levels. It's noted that non-sinusoidal current ends up in several issues for the utility power offer company, admire low power issue, low energy potency, magnetism interference (EMI), distortion of line voltage etc. Passive filters are used as an answer to unravel harmonic current issues, however owing to the many disadvantage of passive filter love it will mitigate solely few harmonics and offers rise to resonance downside. in addition, passive filters have disadvantage of bulk size .To influence these blessings, recent efforts are focused within the development of active filters, that area unit able to compensate not solely harmonics however additionally uneven currents that is caused by nonlinear and unbalanced masses. owing to the exceptional progress within the last 20 years within the field of power physical science devices with forced com-mutation, active filters are extensively studied and an oversized variety of the works are revealed. There area unit essentially 2 forms of active filters: the shunt sort and series sort. Shunt connected active power filter, with a self-controlled dc bus used for reactive power compensation in power transmission systems. Shunt active power filters compensate load current harmonics by injecting equal-but opposite harmonic compensating current. Series active power filters were introduced by the tip of the Nineteen Eighties and operate primarily as a transformer and as a harmonic isolator between the nonlinear load and therefore the utility system. The series-connected filter protects the buyer from AN inadequate offer voltage quality. The series active filter injects a voltage element nonparallel with the provision voltage and so may be thought to be a controlled voltage supply,

compensating voltage sags and swells on the load facet. Until currently several management ways are developed however fast active and reactive current (id-iq) element methodology and fast active and reactive power (p-q) methodology area unit additional common ways.

This project primarily concentrates on these 2 management ways (id-iq and p-q) with PI controller. Each ways area unit compared beneath distorted main voltage condition and it's found that id-iq management methodology deliver the goods superior harmonic compensation performance. The id-iq management is predicated on a synchronous rotating frame derived from the mains voltages while not the utilization of a phase-locked loop (PLL). By the id-iq management methodology several synchronization issues area unit avoided and a really frequency-independent filter is achieved.

2. PROBLEM DEFINITION

From the previous literature review, it is observed that harmonic is an well-known Problem of high complexity. To solve this problem we have

- To provide compensation for harmonic load current components.
- To study the control strategy of the Smart Filter for the reduction of harmonic currents of the voltage source type of non-linear loads.
- To develop the non-linear model of three-phase SH-APF.
- To develop the non-linear model of three-phase Smart Filter.
- To check how this technique is better than others in terms of reliability and efficiency.

3. FBS HYBRID POWER FILTER

1. General Description of the FBS Hybrid Power Filter: An antecedent given FBS passive power filter will over a reasonably smart behavior once applied to eliminate current harmonics in three-phase four-wire systems beneath optimum in operation conditions. However, the filtering characteristic of the FBS passive power filter is tormented by typical issues of any passive filter, i.e., its filtering capability depends on the worth of the grid impedance; once there exists risk of resonance, retuning is critical because of ageing and tolerances. An answer to beat draw backs related to passive filters consists of group action an influence convertor into the filter structure. This filtering system is thought as a hybrid power. A properly designed and well controlled power convertor will generate any voltage current relationship at its output, clearly only if it works within its operative varies. Therefore, such power convertor may be understood as "virtual impedance" integrated into the initial structure of the passive filter. This virtual resistance improves the behavior of the initial passive filter by increasing its capability for debilitating Buckeye State current harmonics at frequencies completely different from the resonance ones, compensating drifts within the passive filter parameters, and damping oscillations because of resonance phenomena. Typical three-phase three-wire hybrid filters square measure accustomed integrate a three-leg full-bridge voltage-source electrical converter (VSI) (without neutral connection) to boost the filter characteristic for pn-seq current harmonics.

2. Specific Three-Phase Four-Wire Implementation of the FBS Hybrid Power Filter:

completely different implementations of FBS hybrid power filters are often achieved looking on each the quality of the branch impedances and therefore the topology of the VSI. a particular implementation of a three-phase four-wire FBS hybrid power filter that results from group action a four-terminal VSI (four-leg, three-leg with neutral affiliation, 3 single-phase wye connected with neutral connection) into the FBS passive power filter. The section branches square measure recognised by LC resonant cells, and the neutral branch is recognised by associate inductance. Resonance frequencies f_{12} and f_0 for the pn-seq and z-seq square measure given by five.9 and, 5.10 severally. The VSI will at the same time synthesize each pn-seq and z-seq voltages at its output that produces it appropriate for rising each the pn-seq and therefore the z-seq passive filter characteristics.

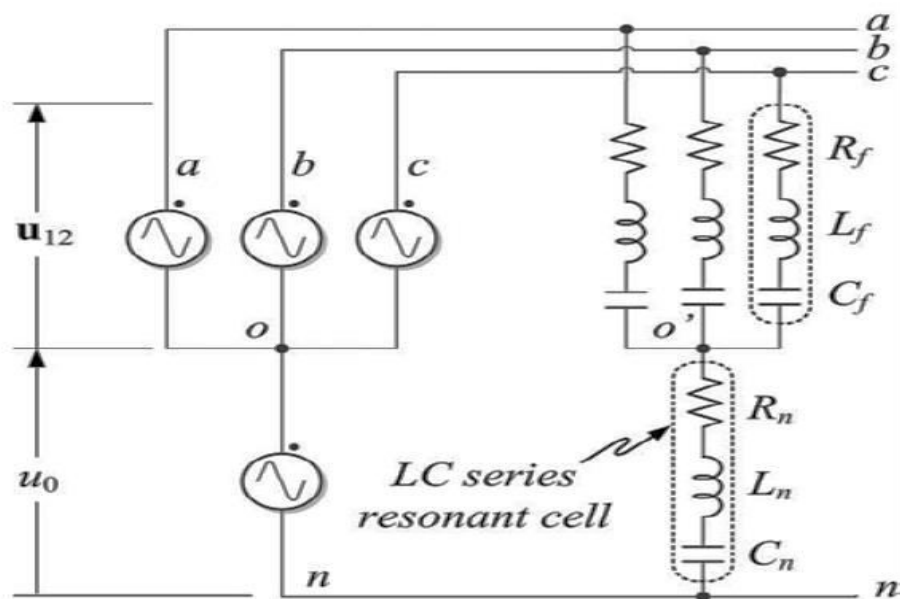


Figure 1: FBS power filter based on simple series LC resonant cells.

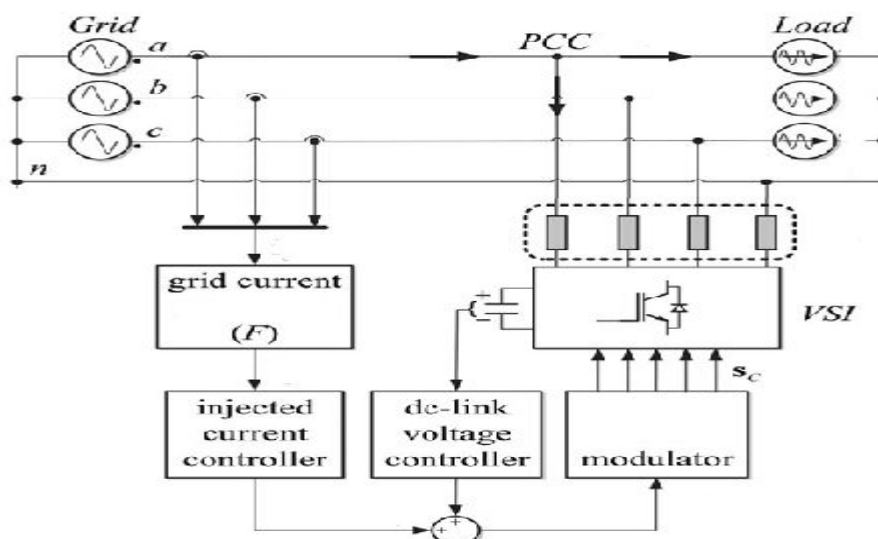


Figure 2: Control diagram of the FBS hybrid power filter.

4. EXPERIMENT RESULTS AND DISCUSSION

Table 1: Grid Parameter

Sr. No.	Parameter	Value/Results
1.	Line voltage	400V
2.	Line Resistance	240m Ohm
3.	Line Inductance	240mH
4.	Frequency	50Hz

Table 2: Load Parameter.

Sr. No.	Parameter	Value/Results
1.	Load Resistance	200 Ohm
2.	Load Inductance	0.1H
3.	Load	10kw

Table 3: Input Parameters of Smart filter.

Sr. No.	Parameter	Value
1.	Filter phase branch inductance	8:5mH
2.	Filter phase branch resistance	244mohm
3.	Filter phase branch capacitance	33:5mF
4.	Filter neutral branch inductance	8:5mH
5.	Filter neutral branch resistance	244m Ohm,
6.	Nominal dc link voltage	45v
7.	DC link capacitor	14100mF
8.	Switching frequency	14:4kHz

Table 4: Output Table

Sr. No	THD with PI Controller	THD with combination of PI and Fuzzy Controller
1	8.5	2.43

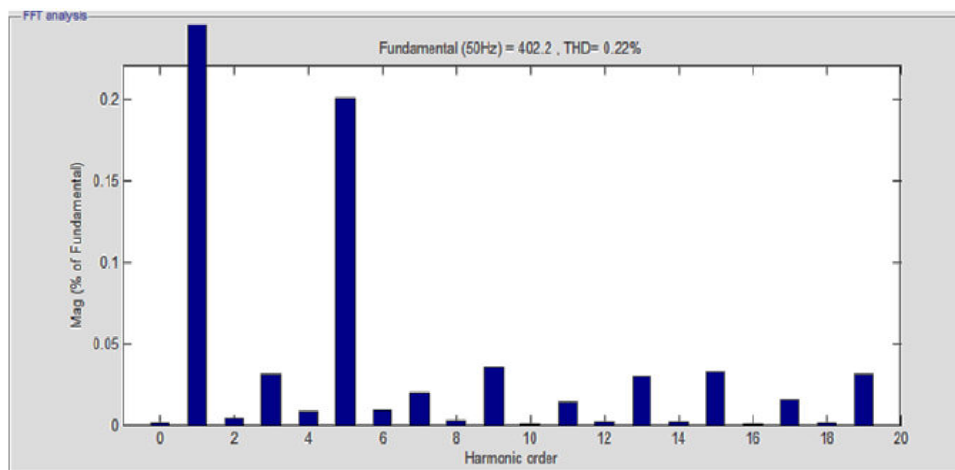


Figure 3: FFT analysis for load current.

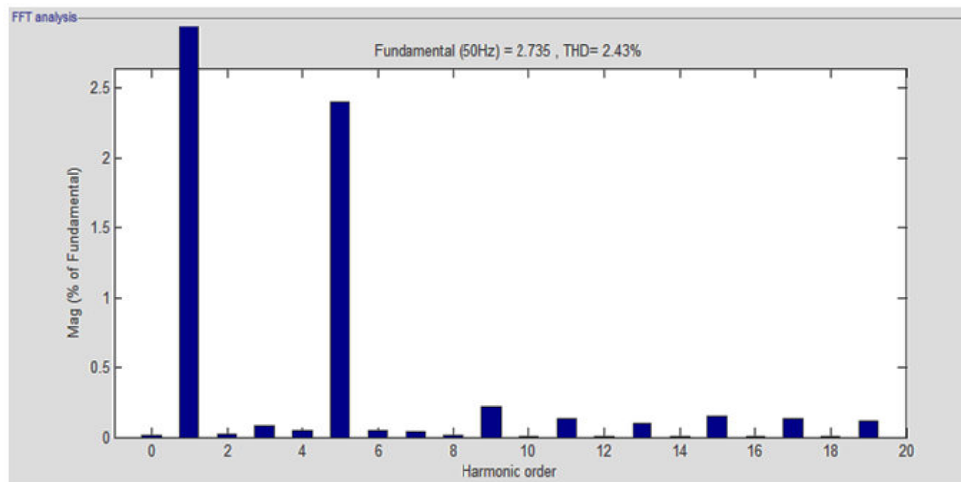


Figure 4: FFT analysis for source-Load current.

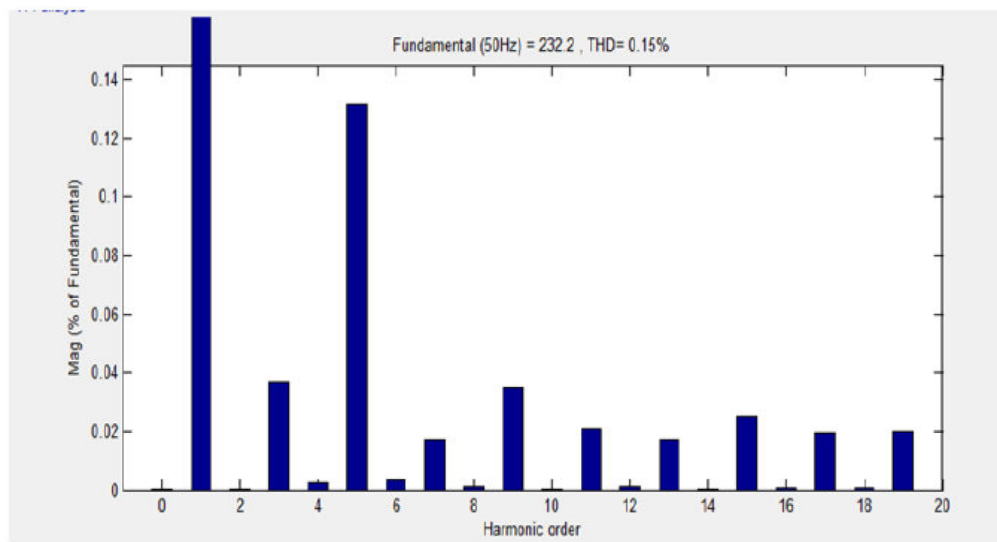


Figure 5: FFT analysis for source voltage.

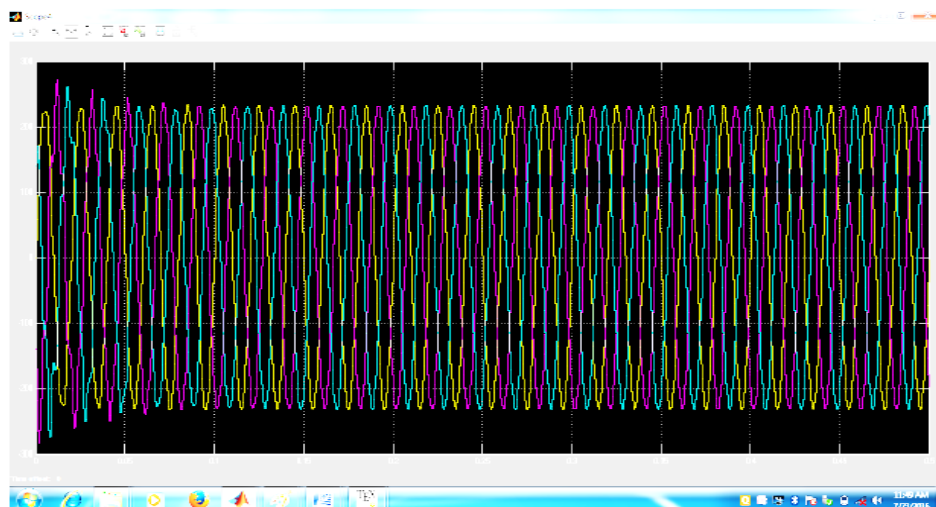


Figure 6 : Simulation Result of Source voltage.

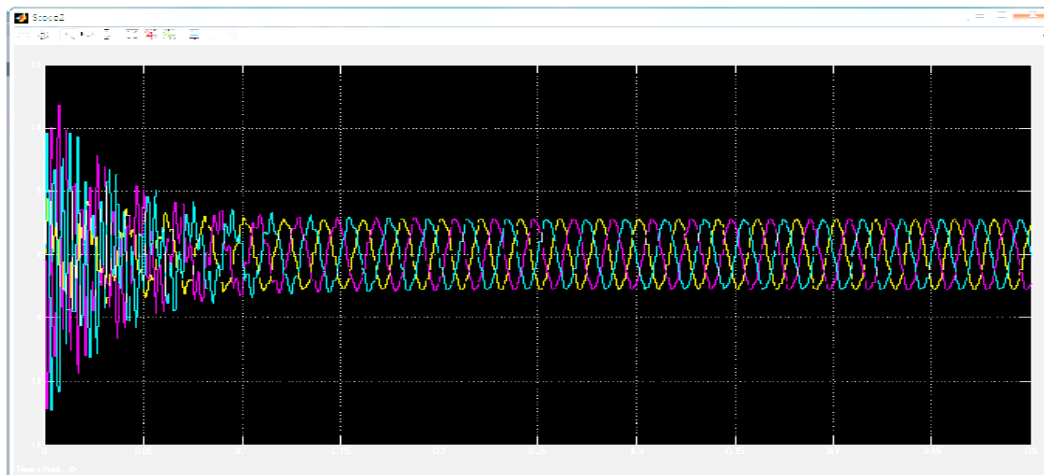


Figure 7: Simulation Result of Source Current.

5. CONCLUSION

In this paper controller's area unit developed and verified with 3 part four wire system. Even supposing each controllers area unit capable to compensate the present and voltages harmonics within the three part 4-wire system, it's ascertained that the fuzzy controller shows a lot of dynamic performance over standard PI controller. Supply voltage and current doctorate is satisfactory reduced by mistreatment sensible filter that area unit check by Simulink/Matlab computer code.

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